THE JOURNAL

OF THE

ROYAL ANTHROPOLOGICAL INSTITUTE

OF

GREAT BRITAIN AND IRELAND.

VOL. XLII.

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NOTICE.

For convenience of reference, all volumes of the new (imperial octavo) series which began in 1898 are numbered in continuation of the old demy octavo series Vols. I–XXVII. Thus Vol. I of the imperial octavo series = Vol. XXVIII of the old series; and the present Vol. XLII corresponds to N.S. Vol. XV.

The Index to the present volume includes an index to the Institute's monthly publication MAN for the year of issue 1912.

CONTENTS.

MISÇELLANEA.

ILLUSTRATIONS.

PLATES.

BLOCKS IN THE TEXT.

ERRATA.

IN VOLUME XLII.

Page 380, line 23, for *Munsumundock* read *Munsumundok.*

Page 381, line 28, for *Sumungulph* read *Surmungup.*

Page 382, line 7, for *haga* read *naga.*

Page 385, line 1, for *Ranan* read *Ranau.*

Page 385, line 12, for *men awa* read *menawa* (possibly the Malay *menawar*, to neutralize).

Page 390, line 21, for *Tompo* read *Yompo.*

Page 395, line 7, for *tanau* read *ranau.*

ERRATUM.

Pp. 312, 314, 315. Owing to an oversight the Burmese vowel sound corresponding to the *a* in "father" has been represented by the character Q instead of **ɑ**.

JOURNAL

OF THE

ROYAL ANTHROPOLOGICAL INSTITUTE

OF GREAT BRITAIN AND IRELAND.

MINUTES OF THE ANNUAL GENERAL MEETING,

JANUARY 23RD, 1912.

Mr. ALFRED P. MAUDSLAY, *President, in the Chair.*

The Minutes of the last Annual General Meeting were read and carried.

The CHAIRMAN appointed Messrs. H. S. KINGSFORD and N. H. HARDY, as scrutineers, and declared the ballot open.

The SECRETARY read the report of Council for 1911, which, on the motion of the CHAIRMAN, was carried unanimously.

The TREASURER read his Report for 1911, which, on the motion of the CHAIRMAN, was carried unanimously.

The PRESIDENT delivered his address, entitled "Some American Problems," illustrated by lantern slides.

On the motion of Professor KEITH an unanimous vote of thanks was passed to the President, and he was requested to permit his address to be published in the Institute's *Journal.*

The SCRUTINEERS then handed in their report, and the following were declared to be duly elected as Officers and Council for 1912–13.

President.—A. P. Maudslay, Esq., M.A., F.S.A., F.R.G.S.

Vice-Presidents

A. Keith, Esq., M.D.
Sir R. B. Martin, Bart., M.A.
W. H. R. Rivers, Esq., M.A., M.D., F.R.S.

Hon. Secretary.—T. A. Joyce, Esq., M.A.

Hon. Treasurer.—J. Gray, Esq., B.Sc.

Council.

M. L. Dames, Esq.
O. M. Dalton, Esq., M.A., F.S.A.
J. Edge-Partington, Esq.
Sir A. J. Evans, M.A., D.Litt., F.R.S., F.B.A.
H. S. Harrison, Esq., D.Sc.
R. R. Marett, Esq., M.A.
C. S. Myers, Esq., M.A., M.D.
F. G. Parsons, Esq., F.R.C.S.
R. H. Pye, Esq.
Professor Carveth Read, M.A.
W. W. Skeat, Esq., M.A.
Professor G. Elliot Smith, M.A., M.D., F.R.S.
Professor A. Thomson, M.A., M.B.
Sir Everard im Thurn, K.C.M.G., C.B.
E. Thurston, Esq., C.I.E.
E. Torday, Esq.
Professor E. Westermarck, Ph.D.
R. W. Williamson, Esq.
W. Wright, Esq., M.B., D.Sc.
G. Udny Yule, Esq., F.S.S.

ANNUAL REPORT FOR 1911.

The Council is happy to report another year of substantial progress, and to record the fact that 40 new fellows have been elected, a number which is only one short of the record. Unfortunately the losses through death and suspension owing to the non-payment of subscriptions have been unusually severe, and the total membership therefore stands at 508, viz., 3 less than last year, at the same time the number of subscribing Fellows is increased by 5. The numerical gains and losses are expressed in the following table :—

	Honorary Fellows.	Corresponding Fellows.	Local Correspondents.	Affiliated Societies.	Members of Affiliated Societies.	Ordinary Fellows.		Total Ordinary.	Total Membership.
						Compounding.	Subscribing.		
1 Jan., 1911 ...	43	4	38[1]	2	5	77	350	427	511
Loss by death or resignation	−3	−2	−2	—	−3	3	−32	−35	−45
Since elected ...	+3	—	+1	—	—	+1	+37	+38	+42
1 Jan., 1912 ...	43	2	37[1]	2	2	75	355	430	508

[1] Of these 8 are also Ordinary Fellows.

Among the losses that the Institute has suffered through death are Sir Francis Galton, Dr. J. Beddoe, and Sir Herbert H. Risley, Past Presidents; Dr. Paul Topinard, Professor T. Rupert Jones, and Dr. A. B. Meyer, Hon. Fellows; and Majors Robertson, Milne, and Rodon, and Messrs. G. H. Haswell, D. F. A. Hervey, C.M.G., J. R. Mortimer, R. S. Wake, and R. Welpley, Ordinary Fellows of the Institute.

To the death of Sir Francis Galton, who joined the Ethnological Society in 1862, allusion has already been made in *Man*, 1911, **22**, and it is unnecessary to enlarge on his services to anthropological science before the Fellows of this Institute. An obituary of Doctor Beddoe, whose connection with the Anthropological Institute, or rather its predecessor, the Ethnological Society, dates from 1854, has also appeared in *Man*, 1911, **93**. In him the Institute has to regret the loss of its Senior Fellow. By a peculiar coincidence his last service to the Institute was the contribution of an obituary notice of his friend, Sir Francis Galton. Through the untimely death of Sir Herbert Risley the Institute has lost one who hoped to devote many years to furthering its interests, and whose charming personality as President is still vivid in the memories of Fellows. A sympathetic account of his life and work will be found in *Man*, 1912, **1**.

In Dr. Paul Topinard France has lost one of her most eminent physical anthropologists, and the Institute one of its most distinguished Honorary Fellows. The influence of Broca induced him to devote his attention to anthropology, and by his death that science loses one of its foremost pioneers. An obituary notice will be found in *Man*, 1912, **19**.

Professor T. Rupert Jones was elected an Honorary Fellow in 1877. His scientific attainments covered a wide scope, and he was better known as a geologist than an archæologist.

Dr. A. B. Meyer, who was elected an Honorary Fellow in 1892, was for many years connected with the Dresden Museum.

Mr. D. F. A. Hervey, C.M.G., who joined the Institute in 1866, had a distinguished career in the Straits Settlements, and was the author of an English and Malay vocabulary as well as of several papers on anthropology and folklore.

Mr. J. R. Mortimer, who became a Fellow in 1894, devoted 50 years to archæological investigations in Yorkshire, and to him all students of prehistoric problems owe an incalculable debt of gratitude. An obituary notice will appear in *Man*, 1912, **13**.

Mr. C. S. Wake was a member of the Anthropological Institute from its commencement, having joined the Anthropological Society in 1863.

Meetings.

During the year ending December 31st, 1911, eleven ordinary meetings were held, at which 14 papers were read: 5 dealing with archæological, 5 with physical, and 4 with ethnographical subjects. Eight exhibitions of specimens were made.

Huxley Memorial Medal.

The Huxley Memorial Medal was this year presented to Professor Felix von Luschan. The title of his lecture, which was delivered on November 23rd, was "The Early Inhabitants of Western Asia."

Publications.

During the year two half-yearly parts of the *Journal* have been issued, viz., Vol. XL, 2 (July–December, 1910), and Vol. XLI, 1 (January–June, 1911). Of the former 110 copies were sold, and of the latter 95. The Council is happy to call attention to the fact that the combined sales for this year have only once been exceeded, viz., in 1908, when 14 more copies were sold.

With regard to *Man*, the usual twelve monthly parts have been issued. The sales show an increase even on the record established last year, but the margin of profit is not yet sufficiently large for the Council to recommend that the present system of subscription be abandoned.

Library.

The number of accessions to the library amounts to the satisfactory total of 425 in all, and the exchange list has been augmented by the addition of one British and four foreign publications. The management of the unbound periodicals has been practically completed, and preparation of the catalogue has been considerably advanced.

EXTERNAL.

The Committee appointed by the Council to undertake the preliminary steps necessary for the holding of the XVIIIth International Congress of Americanists in London in 1912, having accomplished its work, was reconstituted as the Organizing Committee of the Congress. Arrangements for the reception of the Congress are practically complete, but funds necessary for its proper entertainment are still deficient, and the Council will be glad to receive any contributions towards that object.

A memorial was sent to the Colonial Premiers in London in the early part of the year urging the establishment in London of a Bureau of Ethnology, which would be in close communication with the Colonies of the Empire. A memorial to the Government on the same subject is now being prepared, and will shortly be presented.

TREASURER'S REPORT FOR THE YEAR 1911.

On the 31st December, 1911, the assets of the Institute were as follows:—

	£	*s.*	*d.*	£	*s.*	*d.*
Assets (not immediately realizable):—						
Books in Library, Publications, Furniture as per estimate of 1903 ...				885	0	0
Realizable Assets:—						
£300 of Metropolitan Consolidated 3½ per Cent. Stock, present value ...	300	0	0			
£886 Burma Railway Company's Ordinary Stock, present value ...	961	6	2			
Balance at Bank	130	13	8			
Petty cash	2	3	1			
Arrears of subscriptions, £75 12*s.* 0*d.*, valued at	23	12	0			
				1,417	14	11
Total Assets				£2,302	14	11
Against which there are liabilities:—						
Anthropological *Notes and Queries* ...	68	10	8			
Library Fund	16	3	5			
				84	14	1
Leaving a surplus, if all property were realized, of				£2,218	0	10
Considering only our immediately realizable assets:—						
These amount to				1,417	14	11
Less				84	14	1
				£1,333	0	10

ROYAL ANTHROPOLOGICAL INSTITUTE

Receipts and Payments

RECEIPTS.	£ s. d.	£ s. d.	£ s. d.
BALANCES in hand, January 1st, 1911 :—			
Balance at Bank	53 14 1		
Petty cash	1 0		
		53 15 1	
Less Balance owed :—			
Library Fund		15 6 0	
			38 9 1
SUBSCRIPTIONS :—			
Current	662 9 6		
Arrears	46 2 0		
Advance	39 18 0		
Life	31 10 0		
Affiliation	2 2 0		
		782 1 6	
Less Refund		2 2 0	
			779 19 6
SALE OF JOURNAL	187 9 0		
Less Refunds from Petty Cash	1 4 2		
		186 4 10	
SALE OF HUXLEY LECTURES		3 16 11	
			190 1 9
"MAN"			
Receipts		228 3 10	
Less refund from Petty Cash		10 0	
			227 13 10
ADVERTISEMENTS			9 4 7
DIVIDENDS			47 8 11
LIBRARY FUND :—			
Balance, January 1st, 1911	15 6 0		
Donation from Anthropological Club	5 0 0		
Grant	30 0 0		
		50 6 0	
Less Binding and Books		34 2 7	
			16 3 5
HOBLEY'S "UGANDA"			21 18 7
"BIBLIOGRAPHY"			51 19 8
"REPORT OF THE ANTHROPOMETRIC COMMITTEE"			7 18 6
"PHYSICAL DETERIORATION (1909)"			7 14 2
SUNDRIES			26 17 8
			£1,425 9 8

We have examined the above accounts and compared them with the Books and Vouchers relating thereto, and find the same to be accurate.

(Signed) RANDALL H. PYE, ORMONDE M. DALTON, } *Auditors.*

January 12*th*, 1912.

OF GREAT BRITAIN AND IRELAND.

for the Year 1911.

PAYMENTS.	£	s.	d.	£	s.	d.
RENT	284	5	0			
Less rent received	38	5	0			
				246	0	0
JOURNAL	305	8	4			
Less refunds	1	1	5			
				304	6	11
ADVERTISING				14	1	1
"MAN"	184	10	5			
Less refund		1	2			
				184	9	3
SALARIES				132	0	1
HOUSEKEEPING				43	16	0
STAMPS AND PARCELS	79	5	6			
Less refunds	1	11	10			
				77	13	8
PRINTING AND STATIONERY				79	4	11
LANTERN				5	2	5
INSURANCE				2	10	1
TRAVELLING				5	15	5
GRANT TO LIBRARY				30	0	0
HUXLEY MEDAL AND LECTURE				2	3	6
HOBLEY'S "UGANDA":—						
Balance as per contra	21	18	7			
Less received in 1911		11	3			
				21	7	4
BIBLIOGRAPHY:—						
Balance as per contra	51	19	8			
Less received in 1911		2	0			
				51	17	8
REPORT OF THE ANTHROPOMETRIC COMMITTEE:—						
Balance as per contra	7	18	6			
Less received in 1911	5	9	7			
				2	8	11
PHYSICAL DETERIORATION:—						
Balance as per contra	7	14	2			
Less received in 1911		2	0			
				7	12	2
DIRECTORIES, SUBSCRIPTIONS TO				8	8	5
TELEPHONE				6	13	6
TYPEWRITER AND TYPEWRITING				24	2	1
SUNDRIES				36	13	6
BALANCE at Bank	130	13	8			
PETTY CASH	2	3	1			
COUNTRY CHEQUES PAID IN BUT NOT CREDITED	6	6	0			
				139	2	9
				£1,425	9	8

J. GRAY,
Honorary Treasurer.

The state of ideal solvency also implies the following additional liabilities :—

	£	s.	d.
Journal (1911)	300	0	0
Unexpended life subscriptions	348	12	0
Total	£648	12	0
Our immediately realizable surplus is	1,333	0	10
Showing a surplus in our Reserve Fund of	£684	8	10

The Financial Position of the Institute.

The total receipts of the Institute are £142 greater than last year, about £100 of which excess is due to collection of arrears.

The receipts from annual subscriptions are £60 more, and one life subscription has been received.

The receipts from the sale of the *Journal* are £12 more, and from the sale of *Man* £42 more.

There is also an increase of £8 9*s.* 7*d.* from advertisements, showing that our publications are beginning to be regarded as a valuable medium for advertising.

The total expenditure this year is £126 less, chiefly owing to the fact that last year £100 was spent on the purchase of an epidiascope, and a considerable sum on fitting up new premises.

The Institute has to thank the Anthropological Club for a grant of £5 to the library.

Thanks to the continued prosperity of the Institute, it has been possible to move into new premises and pay rent and housekeeping greater by £100 without drawing on our investments, but it has not been possible to spend so much on the library and special publications, and other objects of more or less unproductive expenditure, as might be desirable.

J. Gray, *Hon. Treasurer.*

PRESIDENTIAL ADDRESS.

SOME AMERICAN PROBLEMS.

[With Plates I–VI.]

By Alfred P. Maudslay, M.A., F.S.A., F.R.G.S.

The generation has not yet passed away which was brought up solely on the account of the creation of man given in the book of Genesis, and although the intellectual have accepted the theory of evolution, the average man does not take it for granted that his own personality is the result of evolution, but still retains a feeling of diffidence, a feeling that his own origin is not quite a nice thing to enquire into, much the same feeling as is shown about research into a family tree, a fear that a pleasing tradition may have to yield to stubborn facts, and that after all his ancestors did not come over with the Conqueror, or that he was not descended from the Barber-Surgeon of Edward the Confessor.

Until this feeling ceases to have weight in the public mind, and a generation arises brought up in an evolutionary faith and not ashamed of its ancestors, even if they could not count beyond four, and bore some likeness to anthropoid apes, anthropology will not be the popular science that it ought to be. But when once man is " too proud to care from whence he came," curiosity to know how he did become what he now is must surely be the compelling motive for the most attractive of studies.

Meanwhile, the material necessary for this study is fast disappearing. The geologist can examine the structure of the rocks at his leisure, and collect and classify his fossils, and if the record shows a weak place he can go over the ground again at any time, or can study the same phenomena in different localities, and the material is always there for him to examine; but, to use a contradiction of terms, the fossils of the anthropologist are living organisms, and they are fast disappearing or becoming so changed by contact or crossing with higher forms of humanity that their value as fossils is lost. Some physical characteristics doubtless show a wonderful persistence, and this is mainly what gives the great and permanent value to the study of physical anthropology, but social organizations and mental attributes suffer more quickly from foreign contact and are more difficult to trace, and the introduction of any form of script from the outside must at once effect a great change.

It sometimes escapes one's mind that one result of the invention of writing

must have been the shifting of authority from the old to the younger members of a community with a consequent acceleration of progress. No doubt the discovery itself was a very lengthy process, and its results were kept from the laity in the interest of a priestly class, for so long as priests and elders were the sole guardians of laws, customs, and precedent, the Conservative party was sure of its majority, but as soon as the younger members could quote law and precedent from a written text as well as their elders, no doubt some of them started Social Democratic Federations and Fabian Societies and felt convinced that the world was at last going to be put to rights. However, if the study of anthropology helps us to a clearer view of the great changes in human society, it also shows us most clearly that culture and civilization have waxed and waned, and that after all human evolution has been and is likely to be in the long run a very slow process.

It seems now hardly possible to believe that in one's own schooldays it was implied, if not actually taught, that Greek culture and Greek art burst suddenly on the world without previous development. Thanks to a great extent to the labours and discoveries of Members of this Institute that belief is as dead as spontaneous generation is to the biologist, and we know that civilizations of a high order preceded and led up to that wonderful outburst of human achievement which we call Classic Greek.

We have been told lately, on high authority, that there is no such thing as a science of geography, but that it is mainly an affair of explorations, surveys, and map-making; someone may tell us next that there is no such science as anthropology, that it is merely a mixture of biology, history, folklore, and archæology. We must admit that geography and anthropology cannot be classed as exact sciences, such as chemistry or mathematics, and that their classification as sciences all depends on the point of view—geography is the study of the earth as the environment of man, and so borrows from geology, oceanography, climatology, and other sciences; anthropology, as the study of man himself, covers even a wider field, and borrows right and left, and when it comes to questions of distribution and environment even borrows freely from geography.

It is owing to the fact that anthropology casts its net so wide that I have the honour of addressing you to-night, for my only relationship to anthropology comes through its cousin archæology. We know how completely recent archæological research in Europe and the East has changed our ideas about the chronology of civilized man, but there is another great field for similar research which has been sadly neglected, what we have been accustomed to call the New World, the great continent of America, where there are traces of many extinct civilizations well worthy of study.

In using the term civilization I come at once to a difficulty in terminology. Were the Astecs, for instance, a civilized race? Savage, barbarous, civilized, appear to be the only three terms, if we except the makeshift semi-civilized, by which to express the cultural condition of a race, and of these the term "barbarous" has taken on an especial meaning in our ordinary speech, and I invite the

attention of the Fellows of this Institute to the necessity of a more accurate terminology.

The Astecs were civilized in so far as they made use of written records, were good builders and craftsmen, and possessed a rather elaborate social organization, but they were undoubtedly bloodthirsty cannibals, and so in common terms might be classed as savages—but then I have myself had personal friends in other parts of the world who had been notorious cannibals whom I found in other respects to be courtly gentlemen. There was a story told me in Australia (for the truth of which I will not vouch) that Bishop Selwyn once electrified a serious minded audience at a lecture in Sydney by describing a native chief in the Western Pacific as a great friend of his and a perfect gentleman, although he had eaten his brother-in-law. Bishop Selwyn was a great missionary, not only sympathetic towards the barbarous races among whom his work lay, but blessed with that greatest of gifts when dealing with men of a low order of culture, the power of imagination.

Many a hardworking, well-meaning and Godly missionary has failed from the want of that very gift, and has become the laughing stock of some devil-may-care uneducated trader, who with no high purpose, but merely by a natural instinct, has found his way to the confidence and even the affection of the natives.

A study of anthropology might well broaden the outlook of the least imaginative man, and might save us from those two objectionable extremes in our contact with native races, which I may call the "damned nigger" treatment and the "coloured brother" treatment. Anyone with an intelligent interest in anthropology when first brought into contact with a native race will know to some extent what to expect and will avoid disillusionment. It is often the first shock which prejudices the white man against the native and gives no opportunity for the appreciation of good qualities which may underlie contrasted ideals.

Take the extreme case of cannibalism, it loses some of its horror when we know that the desire for human flesh does not arise from a debased appetite, but from an ingrained belief that by eating the flesh of an enemy one is absorbing his strength and courage and adding to the tribal power—I am not saying that this is the only reason for cannibalism, for debased and abnormal appetites are not unknown.

It is on the fact that some knowledge of anthropology is essential in successfully dealing with native races that we rely in our efforts to induce the Government to establish an anthropological bureau worthy of a nation which bears so vast a responsibility as the ruler of countless thousands of people of lower culture.

When our Secretary, who is very forehanded, wrote to me two months ago for the title of my presidential address, I had not written a word of it, but I ventured on the title "Some American Problems," as that was the only subject of anthropological interest on which I felt that I had any justification of addressing you at all, and as it seemed appropriate to this year during which we are to receive a visit from the International Congress of Americanists.

However, I am not going to trouble you with the difficult questions of tertiary geography or the origin of the American race, but to direct your attention to some matters which give food for thought and need further investigation.

First of all I must allude to the assertion so frequently urged that American culture was derived from Asia, not, however, with the purpose of showing how little connection there is between Asia and America in such matters as weapons, clothing, methods of conveyance, modes of burial, etc., the evidence on such points having been ably discussed by Dr. Otis Mason, Professor Edward Morse, and others, but to call attention to some other facts which have often been overlooked and still require further consideration at the hands of the zoologist and botanist.

There can be no better test of the antiquity of the settled status of a race than the number and excellence of the food plants which it has brought from a wild to a cultivated condition, and the animals it has brought under domestication. If the origin of wheat as a cereal takes us back to the dawn of human culture in the old world, the cultivation of maize from an obscure wild plant must take us back to an equally distant time in America, and the evolution by human selection of such cereals as wheat and maize of necessity connote the existence of a settled agricultural community. To the number of important food plants raised in America from a wild to a cultivated condition must be added, potatoes, tomatoes, and several kinds of beans, and perhaps manihoc and kumara, the sweet potato. All plants of such importance that after the discovery of America they rapidly became staple foods of all tropical and semi-tropical countries, and in some cases, where the original plant was the native of high altitutes, such as the potato, extended into temperate climates, and we must not omit the cultivation and use of tobacco, which, until the sixteenth century, was confined to the New World.

The domesticated animals of America have not met with the same reception in the Old World, for the edible dog apparently did not find favour with European palates, and conditions of environment probably restricted the use of the llama and the alpaca to the western side of the South American Continent. But there we have two distinct breeds, one a wool-bearing animal and the other a beast of burden, evolved and domesticated from a wild form.

The domestication of these animals and the cultivation of these plants from wild species, some of which cannot now be identified, must have been a slow process, extending over hundreds and perhaps thousands of years, and they must have been brought to their state of perfection before communities existed capable of such architectural and sculptural achievement as we find in Central America and Peru.

Is it possible to imagine that during this long period, if American culture were derived from Asia, that a grain of wheat or rice should not have found its way to America, or tobacco seed or a grain of maize should not have travelled to Asia?

Neither the wild banana, which is found in some islands of the Pacific, nor any of the cultivated varieties so plentiful in the East, were known in America, and Bernal Diaz tells us he planted the first cultivated oranges in Mexico.

I place these facts with regard to cultivation and domestication ahead of all others in regard to the antiquity of civilized man on the American Continent, and the development of his culture free from European or Asiatic influence.

It is, I believe, generally accepted that the various peoples of the American Continent, with the exception of the people in the Far North, resemble one another more closely than any one of them resembles an Asiatic or European race, and their over three hundred mutually unintelligible languages are more closely allied to one another than any one of them is to a language in another part of the world. However, we must remember that we are dealing with a problem of great complexity, and that during the long period of human development on the American Continent race must have overrun race, and one form of culture must have succeeded another, and to disentangle the skein we certainly cannot rely on archæology alone, but must call in the help of the physical anthropologist and craniologist, and invoke the aid of every other branch of anthropological research, not omitting the astronomers.

But that archæology may sometimes point the way, let me give you one instance which I think merits further investigation.

You have here a drawing of a monument which I found at Ixkum, in Northern Guatemala (Plate I). I may say, parenthetically, that a plaster cast of that monument is in London, one of the large series of casts of American sculptures which I presented to the nation, but the Education Department of our Government, after allowing them to suffer very considerable damage, has kindly taken them to pieces and re-interred them in the vaults of the Victoria and Albert Museum, whence they may possibly be unearthed in years to come by Macaulay's New Zealander if he happens to have a taste for excavation, and their presence there will certainly puzzle him, but may conduce to his education in the ways of ancient education departments. But to return to the monument: In the upper part you will see two typical big-nosed Mayas, and in the lower part, two snub-nosed figures bound with cords, evidently prisoners, on whom the Mayas are treading. Excepting a mutilated stela at Tikal, this is the only monument of the kind that I found, but since that time Mr. Theobert Maler has discovered a number of similar monuments in the district of Peten, within forty miles of Ixkum.

Could there possibly be more divergent types. The comparatively tall big-nosed Maya, with the artificially depressed forehead, who would have the characteristic straight, coarse hair of his race, and the squat, snub-nosed, wiry-haired, broad-faced prisoner with a rounded forehead. Yet this is not a fancy picture, and the two distinct races must have coexisted. Luckily there is a date in the Maya inscription on the monument which at some future time may be of use in establishing an historical fact.

Now I am going to make a suggestion—by no means an assertion :—

The principal Maya ruins are all situated in the low country, and I think it possible that the prisoners were a hill people whose habitat may have extended through a great part of the high land running through Central America and Mexico.

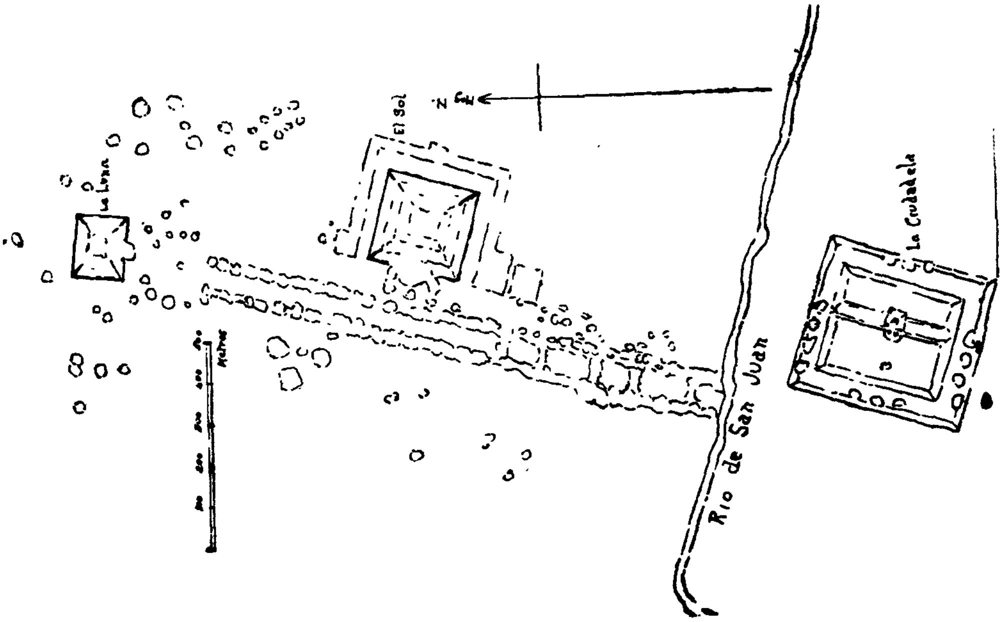
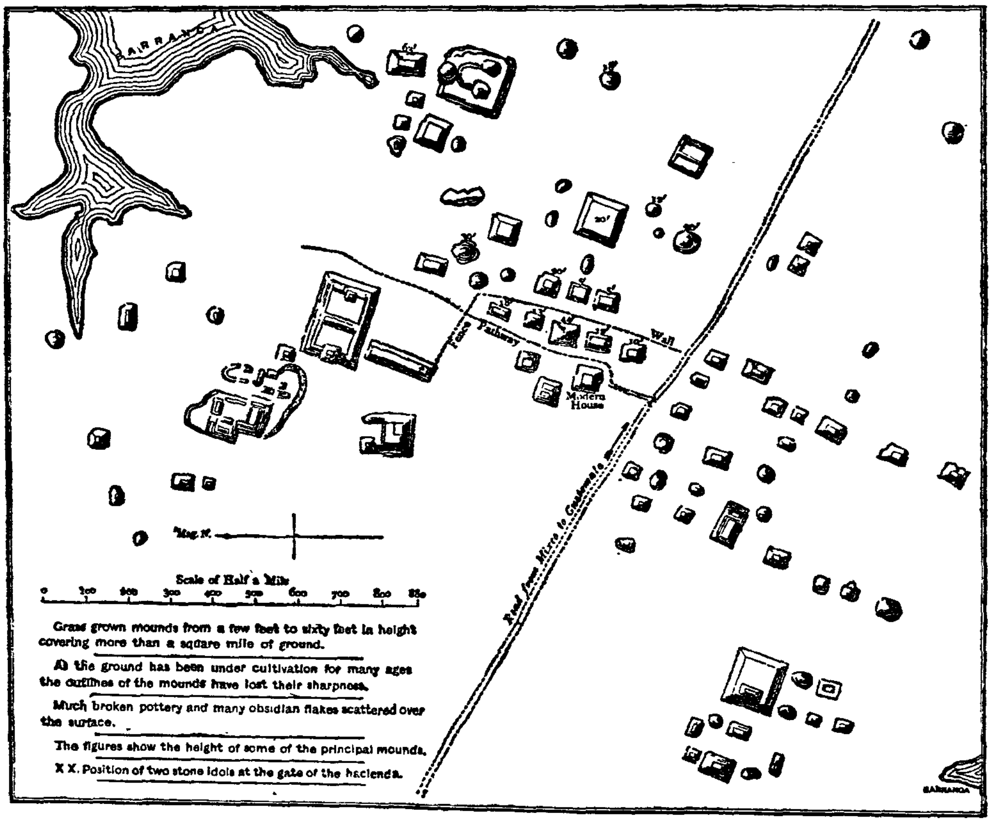


FIG. 1.—RUINS OF SAN JUAN TEOTIHUACAN.



PLAN OF THE RUINED TOWN BETWEEN GUATEMALA AND MIXCO.

FIG. 2.

On the plain to the west of the city of Guatemala, at an elevation of about 5,000 feet, between the city and the village of Mixco, are the remains of an Indian town extending over more than a square mile (Fig. 2). I quote from my notes:—
"The plain is now under cultivation, and has probably been so for a great number of years, and the plough has rounded off the edges of the higher foundation mounds, and some of the lower mounds have been almost entirely worn away.

"The surface of the ground is strewn with potsherds, some pieces showing traces of colour, and with chips and flakes of obsidian. I found one stone axe and the fragment of a pottery head very well moulded.

"There are also to be found, lying in front of Señor Arevalo's house, some fragments of stone frogs about nine inches long, very rudely carved, and many pieces of mealing stones and rollers.

"The two squat stone figures, now placed on either side of the gateway leading to Señor Arevalo's house, were found in the neighbourhood of the mounds, and a similar figure, now much mutilated, stands by the roadside near the entrance to the city (Plate II).

"The mounds themselves are composed of earth, and even where cuttings had been made into them I could see no trace of stonework. However, Señor Arevalo, whose house is built on the top of one of the mounds, and whose farmland extends for some distance among them, told me that he had dug out a good many stones from the interior of the mounds, and he showed me some which he had used in building his stables. These stones were of volcanic rock, well faced and measuring about 3 feet by 1 foot by 6 inches—one of them had the head of an animal cut on it in low relief."

If you will compare the figures on the Ixkum monument with the two stone figures from Guatemala, I think you may trace some resemblance, always bearing in mind that the Ixkum monument is the work of a Maya sculptor, and the stone figures the rude work of a less artistic race.

The plan now shown gives only the principal groups of mounds, and those to the south-west are not very accurately plotted.

While the plan is on the screen I will ask you to notice the general orientation of the mounds, especially the line between the two principal rows of mounds, and the form of the structure with a double courtyard.

I will now take you to San Juan Teotihuacan, about twenty-five miles north-east of the city of Mexico, at an elevation of over 7,000 feet, where stand the remains of a pre-Astic city, which, like the mounds near Guatemala, is without history or tradition (Fig. 1). You will notice how very nearly the general orientation of the two agree, and that what is now known at Teotihuacan as the "street of the dead," probably a processional road lying between the great pyramids of the sun and the moon (so-called), coincides very nearly with the line between the mounds at Guatemala.

Then please observe the building with the double courtyard.

The one great stone monument found at Teotihuacan (Plate III) has been

transferred to the National Museum in Mexico, and it might well answer to the snub-nosed, broad-faced race shown at Ixkum and Guatemala.

I have put forward the matter of the Ixkum figures and the possib... an extinct mountain race merely as a suggestion, to draw attention to the... that there is evidence of a race which has not been accounted for, and to show that there are interesting remains even within half-an-hour's walk of the capital city of Guatemala which have never yet received any scientific examination.

There is a point to be noticed, tending to show the antiquity of American culture, in what I may call the distinctiveness of American art. Of this, the well-known and easily accessible ruins of Mitla furnish the best exam... The buildings shown on Plate IV have a distinct and highly specialize... yle of architecture.

There are certain features, such as the general arrangement ... plan and the outline of the cornice, which are found elsewhere, but the inla... decoration is unique. The designs are all geometrical, and there are none ... human or grotesque figures or feather decoration so frequently met with th... Central America and Mexico. There are two cruciform tombs within a f... of Mitla with similar internal decoration, and these tombs may be consi... part of Mitla itself, but outside this very narrow limit there is no building ... resembling those you have seen on the screen. The nearest approach to th... style is to be found in Northern Yucatan, where the Ball court temp... at C... shows some slight resemblance in the alternation of the panels, a... building known as the Monjas, where there are some panels approaching the Mitla sty... and the same may be said of some of the buildings at Uxmal and elsewhere, b... the likeness is not very close. Curiously enough, the nearest approach to ... Mitla decoration is to be found at Chimu, near Trujillo, in Peru, but th... patterns are executed in stucco, covering massive stone walls, and it ... much more probable that the ornament was independently derived from similar sources than that one style was copied from the other. How did it possibly come about tha... one small valley, only a few square miles in extent, was able to produce artists who could originate and carry to perfection such a highly specialized style, and could leave behind them buildings which exhibit its characteristics so completely and yet leave nothing to show how they arrived at that perfection? The other ruins in the vicinity of Mitla, such as those at Monte Alban, distant about thirty-five miles, are of an entirely different style and much more completely ruined, and the views now shown of the principal building at Xochicalco shows a different style of decoration and execution.

It may be suggested that the people of Mitla were migrants and brought their art with them, then we are confronted by the question of where they brought it from, the alternative is that they had existed at Mitla long enough to develop their style on the spot, and for all the results of their earlier artistic efforts to have disappeared, which would strain our credulity too far. So the matter remains a puzzle and one that is not so likely to be worked out by a further examination

of Mitla itself as by careful archæological exploration in the surrounding country in hope of forging links in a chain of evidence.

T[illegible] the decoration of Mitla appears to be a translation of textile and basketwork into stone, influenced, of course, by the motives which are most prevalent in all American art.

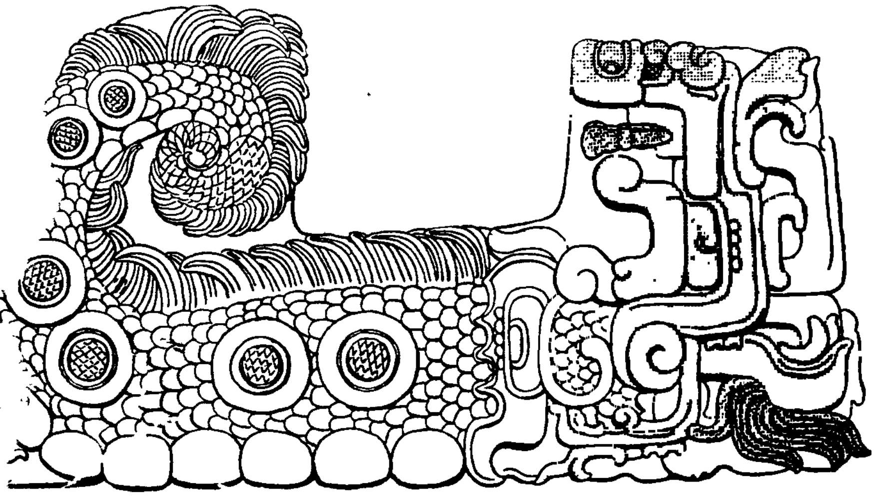


FIG. 3.—FEATHERED SNAKE FROM COPAN.

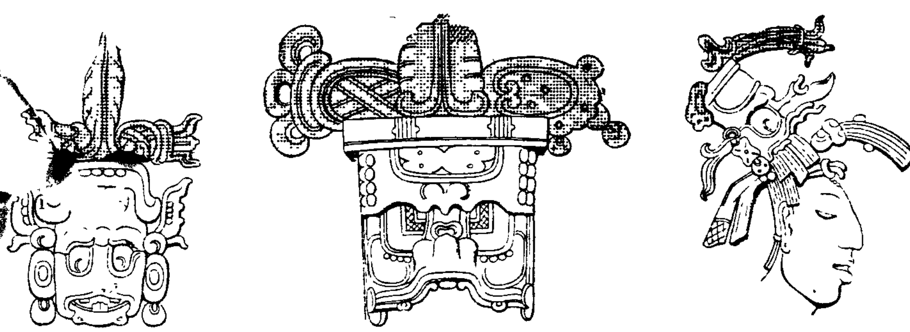


FIG. 4.

Of these, the most important is the serpent motive, usually the feathered snake, in the Nahuatl language Quetzalcoatl, that is, quetzal, the beautiful bird (*Trogon resplendens*), and coatl, a snake (Fig. 3). Quetzalcoatl was, apparently, the culture god of the Mayas and the Nahuas. The grotesque head is certainly very difficult to recognize as the head of a snake. The idea is often expressed in the form of a two-headed snake or dragon, that is, with a head at each end. Frequently, one head has a very much elongated snout, and the other a shorter snout (Plate V). The short-nosed head is usually accompanied by certain marks, and bears a "kin" or sun mark on the forehead. These marks enable us to identify the short-nosed head when it is used independently, as is often the case, as a mask or head ornament (Fig. 4).

The long-nosed head may be the origin of a design so frequently met with in Yucatan, which is seen in its extreme form at Kabah, where the whole façade of a building is made up of these symbols (Plate VI).

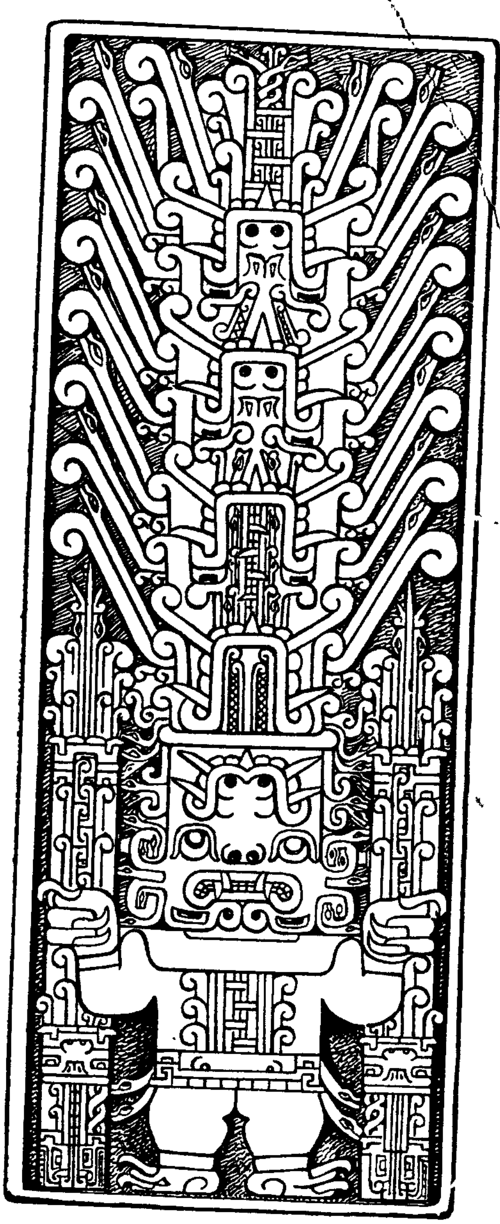


FIG. 5.—THE CHAVIN STONE.

To show how very general this form of decoration is in American art I will place on the screen a photograph of what is known as the Chavin stone (Fig. 5) from Peru, and if this photograph is turned upside down you will note the succession of masks, which may possibly be those of the long-nosed snake.

The eye of the snake is used to-day as an ornament on pottery at Oaxaca, without the potter, so far as I know, having any knowledge of its origin.

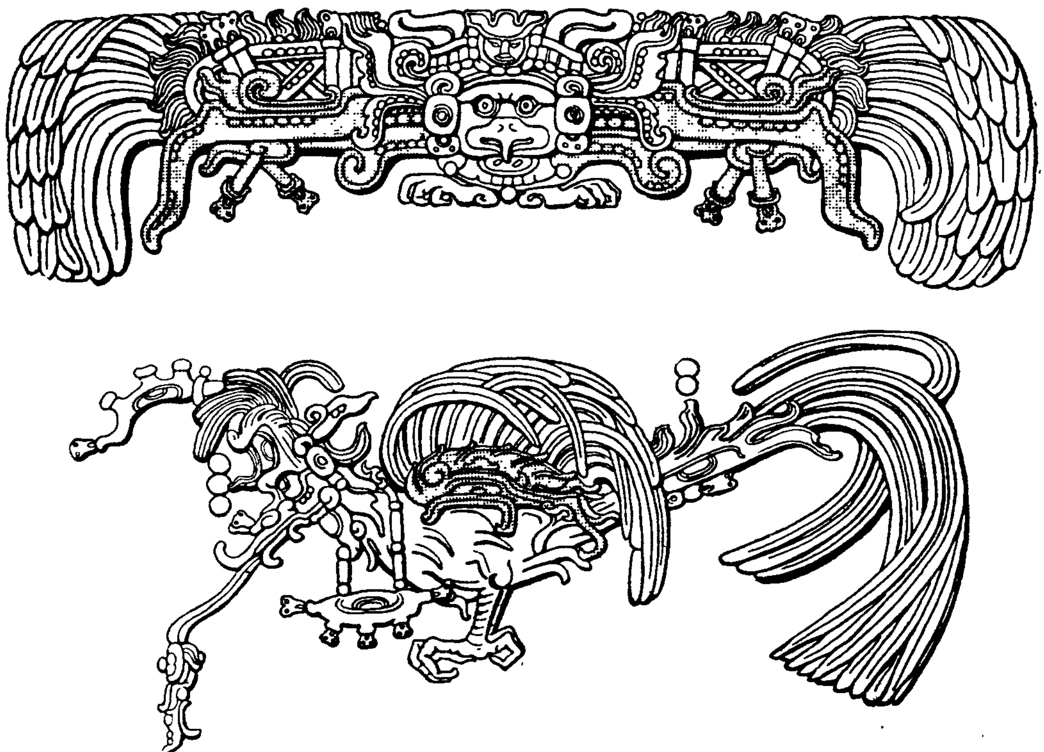


FIG. 6.

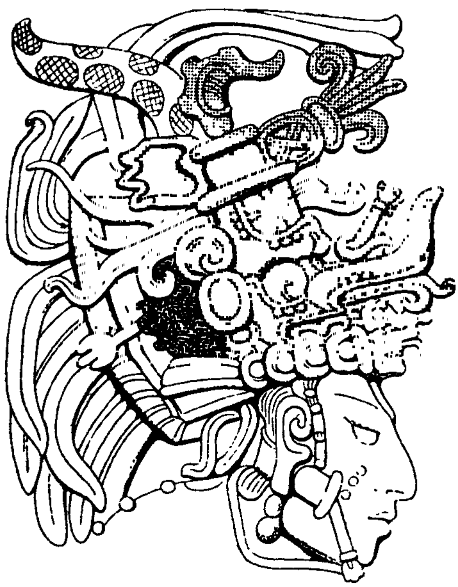
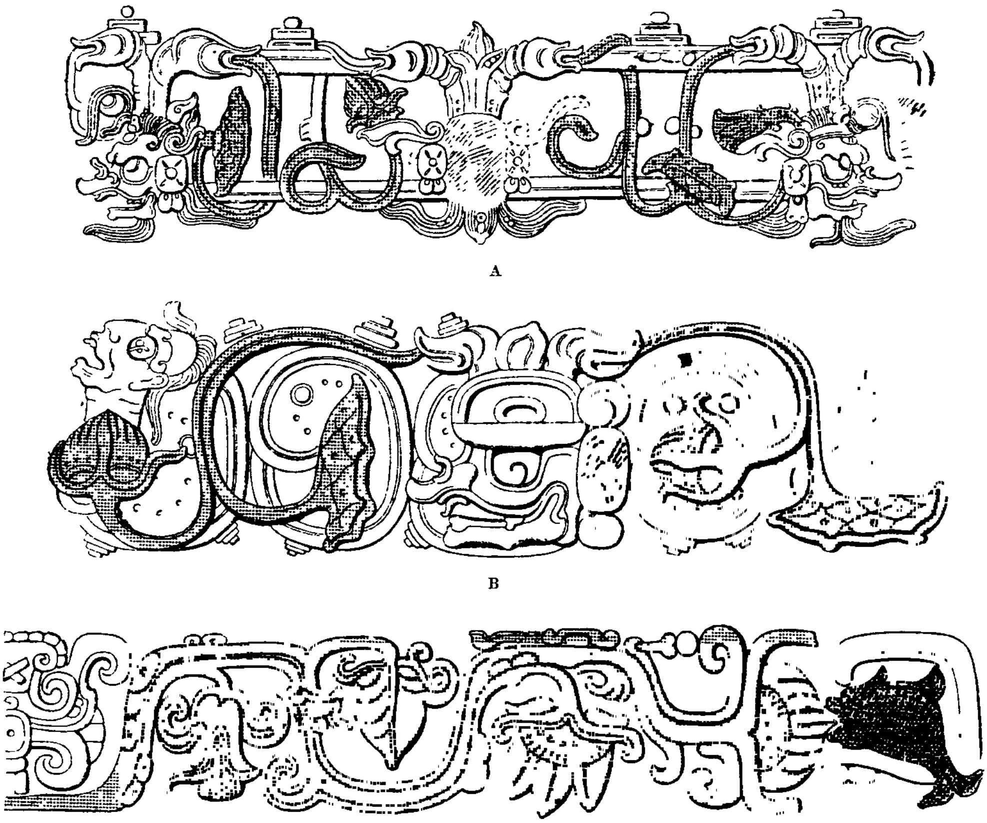


FIG. 7.

Sometimes the bird, the quetzal, takes the more prominent place in the design, and we have what I have ventured to call the serpent bird, where the serpent motive is portrayed on the bony part of the wing (Fig. 6).

It will be now seen how we can disentangle the apparently complicated headdress of a figure carved on a stone lintel at Menché on the Rio Usumacinta (Fig. 7), which consists of the head of the shorter-snouted snake with the kin mark on its forehead, and the signs which usually accompany it (light shading), and the wing of the serpent bird showing the eye and teeth of the snake motive (dark shading).



A

B

C

FIG. 8.—EXAMPLES OF WATER PLANT. A AND B FROM PALENQUE, C FROM CHICHÉN ITZÁ.

The next most important motive in the decoration art of Central America is that of the water plant. I will not call it a lotus, although, no doubt, many may feel inclined to do so (Figs. 8 and 9). This is not nearly as prevalent or as important as the serpent motive, but it is equally interesting, for, strangely enough, it is the only vegetable form used in Central American art.

We are so used to foliations in decorative art that it comes as a surprise in analyzing some elaborate example of American design to find vegetable forms entirely absent, their place being supplied by feather work.

When you look at the last drawing placed on the screen you will understand

why I have not called this plant a lotus, for that drawing is taken from the carved stone ornament on a niche from a Coptic church in the British Museum, dated A.D. 700–900 (Fig. 10).

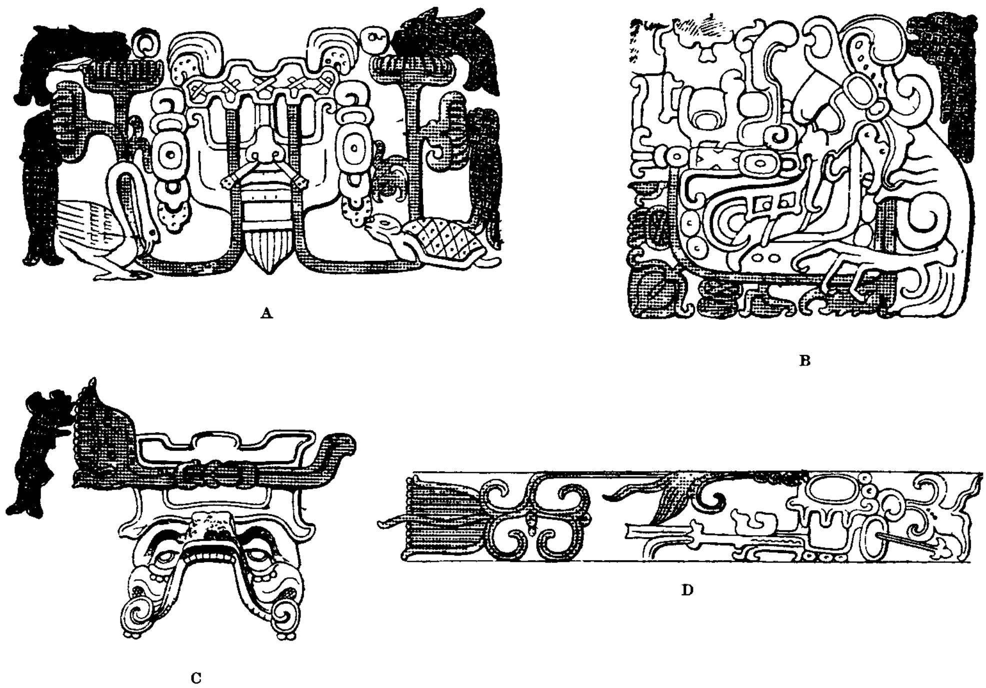


FIG. 9.—EXAMPLES OF WATER PLANT.

FIG. 10.—WATER PLANT FROM A COPTIC CHURCH.

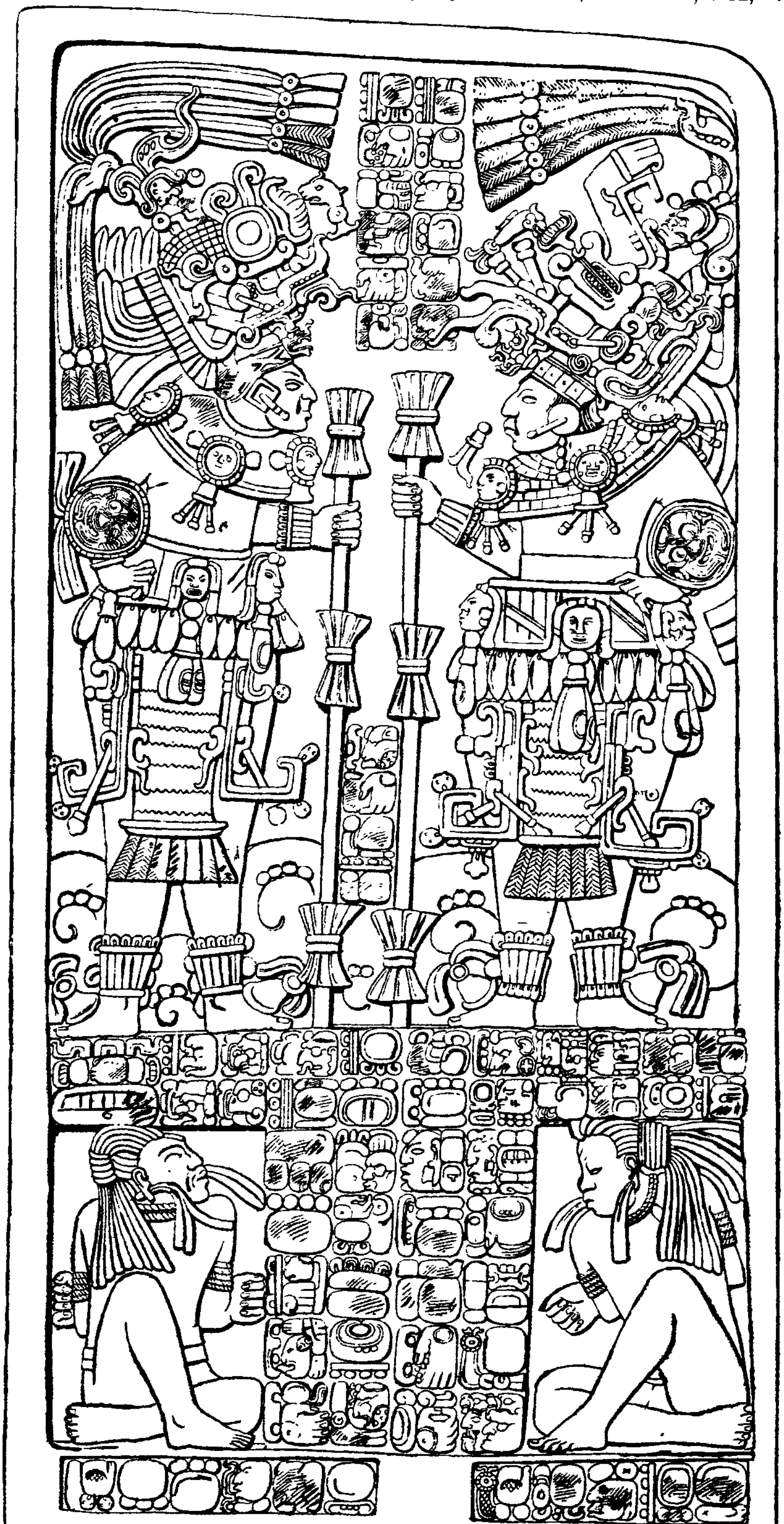
If anyone can establish a connection between Coptic and Maya art he will effect a revolution. My own belief is that it is merely a coincidence, but one not to be overlooked, as showing how careful we must be in tracing connections.

I have dwelt at this length on the subject of sculptured ornament because the preliminary analysis of the highly complicated designs on American monuments must be effected before the more general study of American civilizations can be satisfactorily undertaken.

You have been listening to what I believe is a very unorthodox Presidential Address, for it relies for its interest on the photographs and drawings I have been able to show on the screen.

However, I trust that those pictures have shown to those of you who have not given much attention to native American art what a vast field there is for exploration. In the short time at my disposal to-night I have not been able to touch on more than the fringe of the subject, and have been able to say nothing about the most interesting thing of all, namely, the carved inscriptions and the pre-Columbian codices. At Whitsuntide, we hope to have here with us the leaders of research in these subjects. A session of the Americanist Congress has been held in many of the capital cities of Europe, and four times in North and South America, but it has never met in England before, although we have probably more pre-Columbian objects of interest here than any other European country. Most of these are, of course, preserved in Museums, but there are many in private hands, and we should be most grateful for any information which may enable us to trace them, as we hope to exhibit a loan collection during the session of the Congress at the Imperial Institute. In conclusion, let me appeal to the Fellows of this Institute to use their utmost efforts to make the Americanist Congress of 1912 a success.

[The address was further illustrated by a large number of lantern slides.]

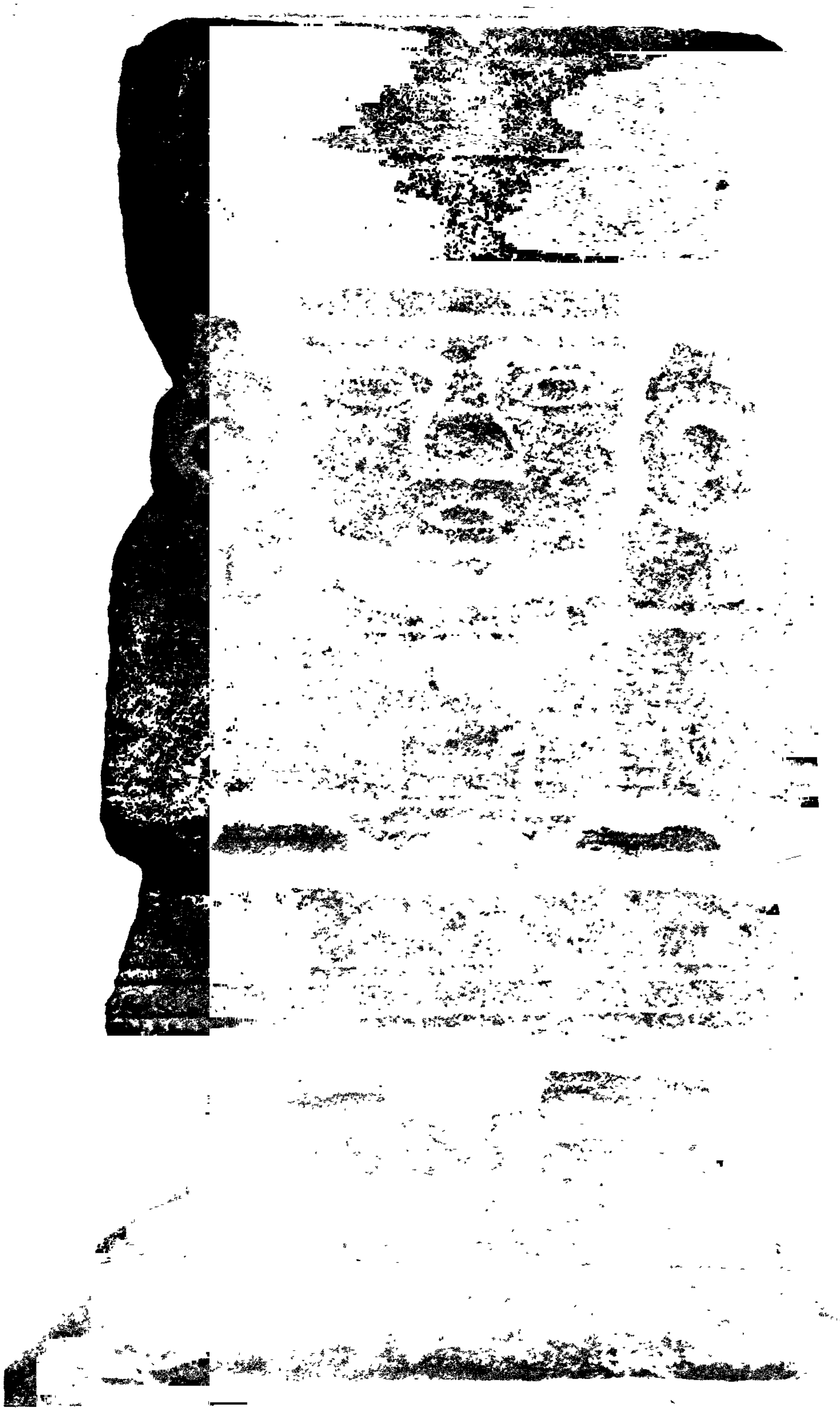


STELA FROM IXKUM, GUATEMALA.

SOME AMERICAN PROBLEMS.

STONE FIGURES FROM THE RUINS BETWEEN GUATEMALA AND MIXCO.

SOME AMERICAN PROBLEMS.



STONE MONUMENT FROM SAN JUAN, TEOTIHUACAN.

SOME AMERICAN PROBLEMS.

FIG. 1.—FROM THE RUINS OF MITLA.

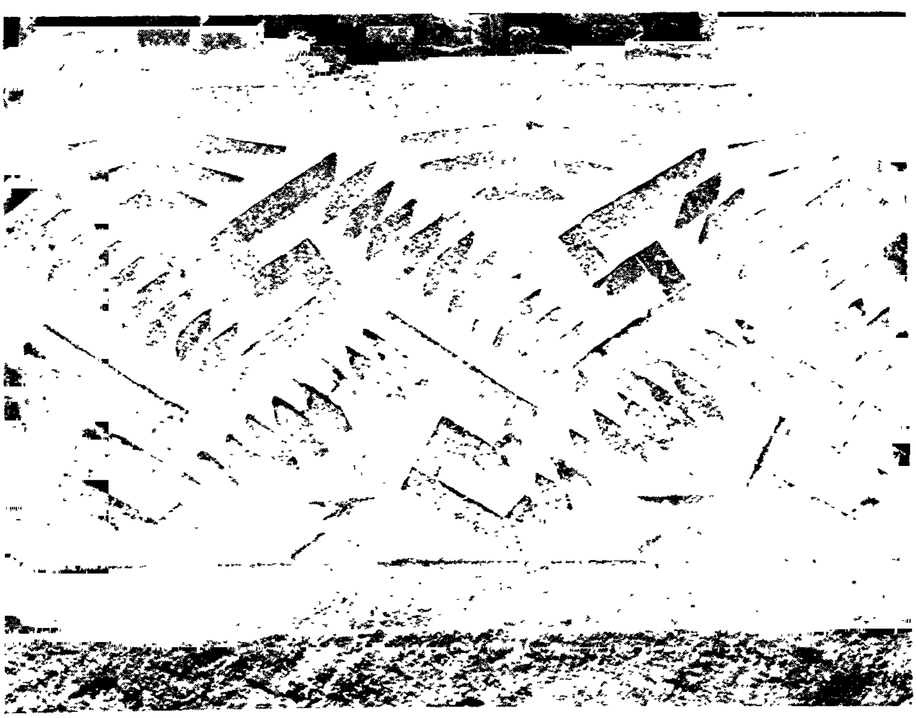
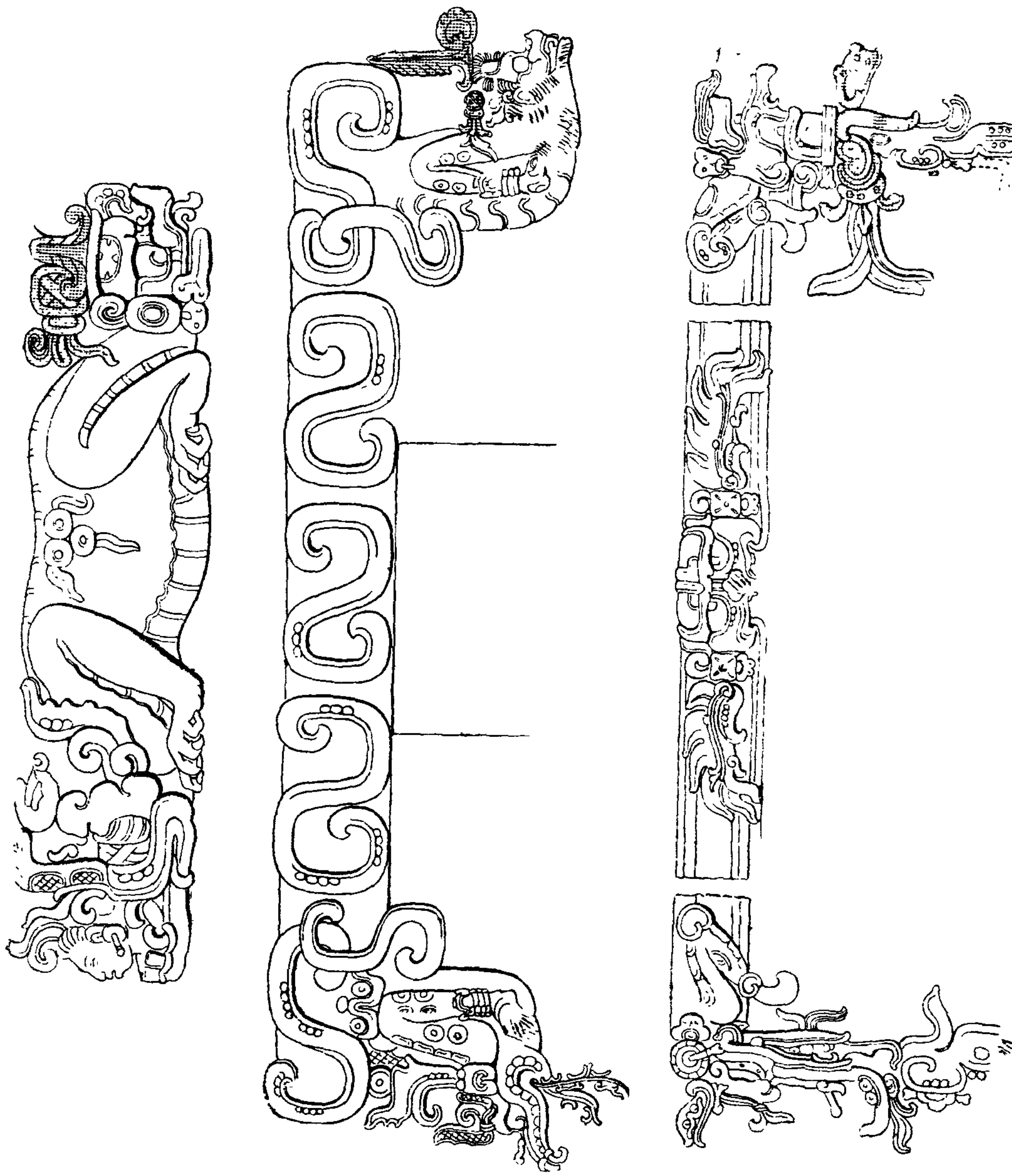


FIG. 2.—FROM THE RUINS OF MITLA.

SOME AMERICAN PROBLEMS.



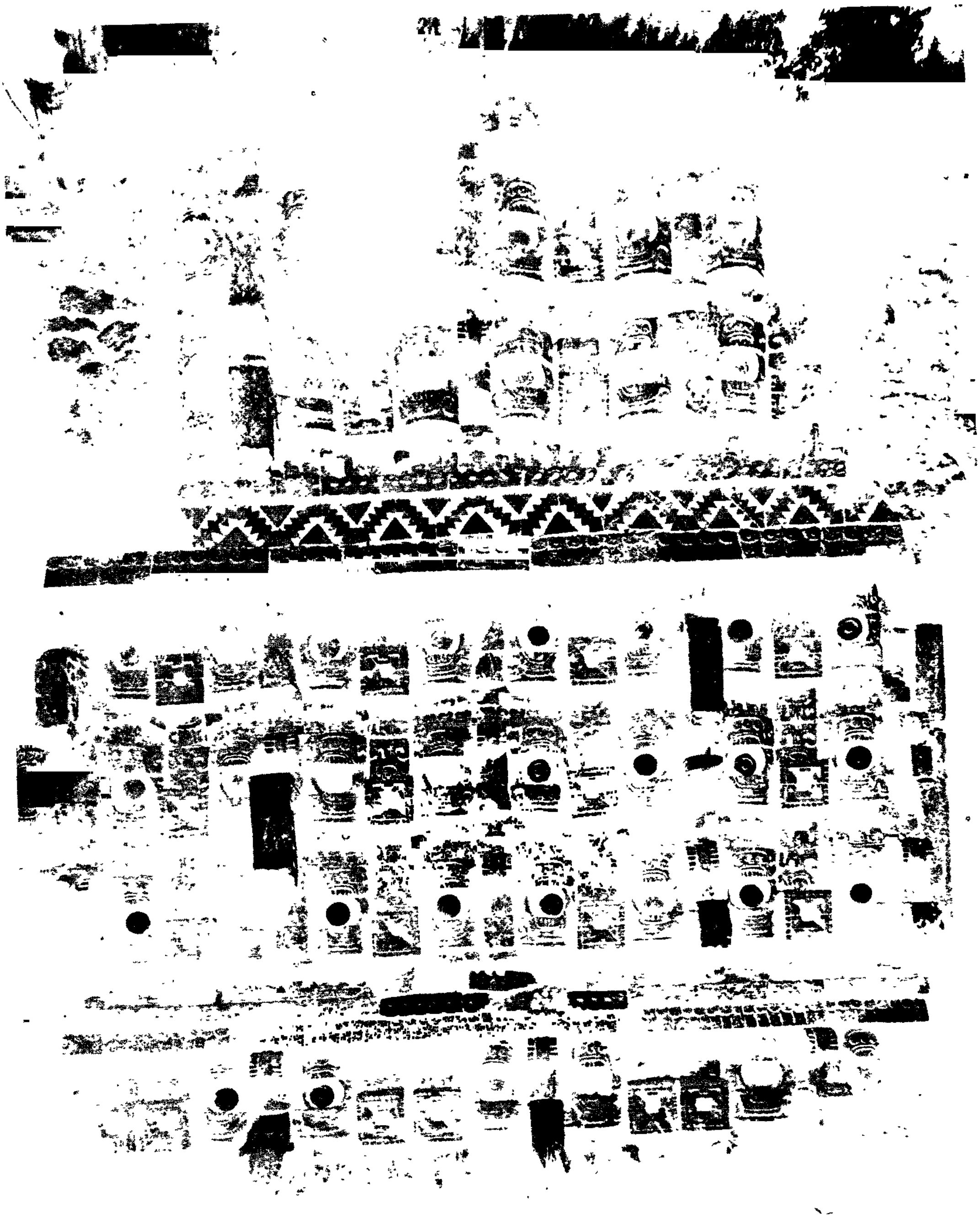
a

b

c

DOUBLE-HEADED SNAKE OR DRAGON. *a* AND *b*.—FROM COPAN. *c*.—FROM PALENQUE.

SOME AMERICAN PROBLEMS.



PART OF FAÇADE, KABAH, YUCATAN.

SOME AMERICAN PROBLEMS.

PREHISTORIC MONUMENTS IN THE OUTER HEBRIDES, AND THEIR ASTRONOMICAL SIGNIFICANCE.

[WITH PLATES VII–IX.]

BY CAPTAIN BOYLE SOMERVILLE, R.N.

DURING the summer of 1909 my duties took me to the neighbourhood of the Outer Hebrides; and the wintry gales which marked that season, having driven me more than once into harbour from hydrographic work in the offing, gave me the chance of visiting some of the prehistoric monuments, of which so many specimens remain on these bleak coasts.

In this paper I propose to discuss the surveys of these monuments, with theodolite and chain, that I was then able to make; and I think I shall be able to show some interesting results from the azimuths, or orientations to be found in them; and to add one more stone to the cairn of evidence which is slowly being accumulated in support of the astronomical,—or, perhaps I should say, astrological—intention of these ancient remains.

I am assuming that the structures in question are the remnants of edifices set up for the purposes of religion, or burial, or for both. The long avenues of stones, anyway, could not have formed part of a *dwelling* house; which presupposes a roofed place.

Careful investigation seems to show that they were, in some cases, places of worship, with burials made in and round them afterwards,—churches, as it were, with graveyards and intramural tombs, as we still see to be customary; or else, in other cases, mausolea, built solely to contain the dead, though with the further intention, possibly, of some form of ancestor worship.

The object of the orientationist is to show that this cult, whatever else it was, was connected definitely with the heavenly bodies: sun, moon, and stars.

The monuments with which I deal here are situated in the Hebrides:—in the north-western part of the Island of Lewis, and in St. Kilda. Those in the first-named island are fairly well known, but have never adequately been discussed from the astronomical standpoint; while those in St. Kilda are, so far as I can ascertain, new to science, and are here described for the first time.

I.—"THE GREAT CIRCLE" OF CALLANISH.

(*Gaelic "Tursachan Challanish."*)

This imposing group of forty-eight megaliths stands on the crest of a small peninsula near the head of East Loch Roag, on the western coast of the Isle of Lewis. The surrounding view is of a hilly country, wild and treeless, covered with heather. Though elevated 100 feet above the sea level, the water of the sea loch is not visible, except in a few gleams here and there, as it winds inwards to Callanish, 7 miles from the open sea.

The accompanying map of the locality (Fig. 1) shows its position, as well as that of other circles with regard to it; and attention is also called to the plan, which is reduced from a careful survey, plotted originally on the scale of $\frac{1}{10}$ inch to 1 foot.

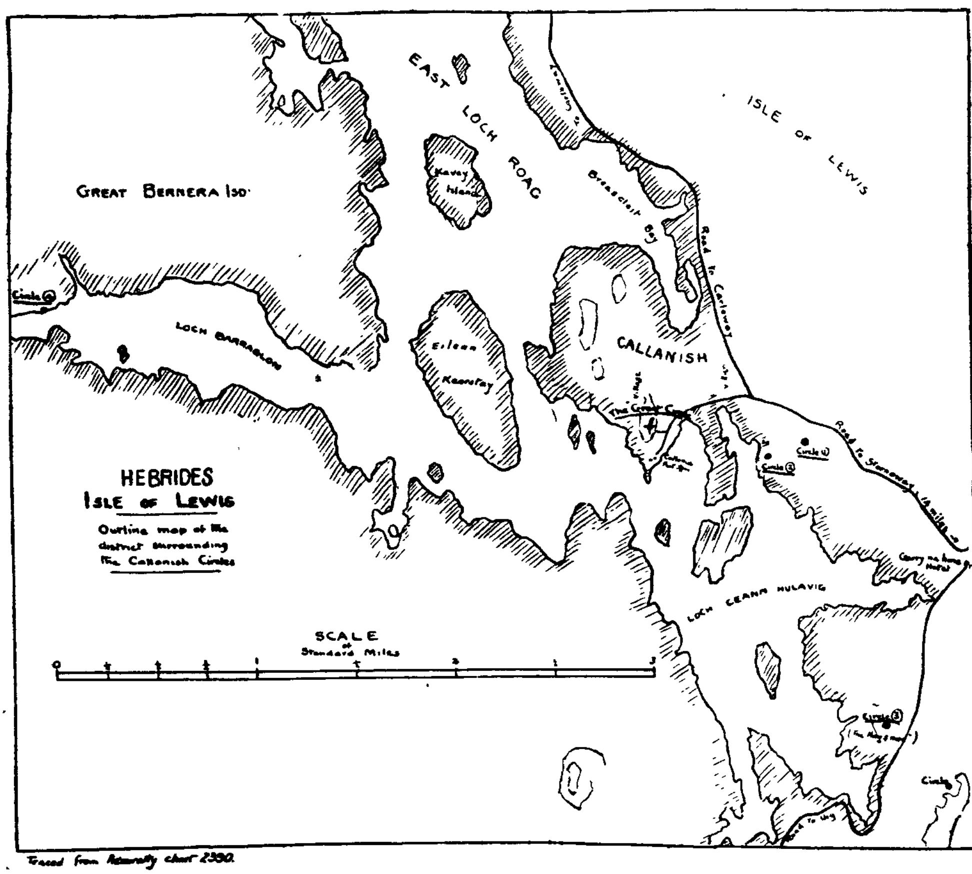


FIG. 1.—MAP OF CALLANISH AND DISTRICT.

I may remark in passing, that it is by laying down the relative positions and attitudes of the stones forming a megalithic group, on a sufficiently large and open scale, such as the above, that alone is it possible to appreciate their orientation. And it is equally important to present them with the true north always directed

in the same way on the paper; that is, most conveniently, upwards, as in a map. It is difficult, indeed, to grasp the identity of orientation of two or more separated monuments, when they are presented, (as they usually are), with the north and south meridian laid down in any and every direction.

The remains consist, as will be seen (Fig. 2), of the following chief features:—

A. Two long lines of menhirs, running nearly parallel to one another, a little eastward of true north. (I shall refer to these as "A east" and "A west," respectively, when describing them.)

B. A short line of menhirs, lying in an east and west direction.

C. A longer line, lying in a north and south direction.

D. A short line, lying in a direction slightly northward of east.

E. A "circle" of thirteen great menhirs.

Besides these, there are a chambered sepulchre; a very large single menhir (which dominates the whole group) lying within the perimeter of the "circle" and three single menhirs without it, to the north-east, south-east, and south-west respectively, standing at no great distance from it.

Before entering into a discussion of these various parts, it may perhaps be advisable to give some explanation of the method by which astronomy is brought to bear upon the archæology of megalithic structures.

When a row of standing stones, or several rows, as at Callanish, have been set up in straight lines, it seems rational to suppose that it was done with some intention, dependent on the direction in which they lie. This becomes even more obvious when it is found that in monuments differing widely in geographical position, the direction of these rows, or alignments, is towards the same points of the horizon. Occasionally the eye is directed by the line of stones to a hill-top, or a cairn on a hill-summit; sometimes, as at Callanish, no object, natural or otherwise, lies along the lines of sight in either direction.

But merely to direct the eye towards such an object as a distant cairn does not seem a very purposeful proceeding; still less is it so when the line leads the eye neither to a cairn nor to anything particularly conspicuous on the earthly horizon. The inference is that we must look beyond the terrestrial termination of the line for some celestial body; and if such, it must naturally be at that moment of its path when it is either rising or setting behind the horizon of the observer. As this land horizon is always elevated above the true, or sea horizon, the body must, at the time of observation, be itself elevated by the same amount.

All heavenly bodies are positioned in the sky by astronomers, according to their right ascension, and declination. These terms correspond, roughly speaking, to the co-ordinates by which a spot is located on the earth; namely, to longitude and latitude respectively. Right ascension governs the time of rising of a heavenly body, declination the bearing on which it rises. If the latitude of the observer, the bearing of the heavenly body, and its elevation above the true, or sea horizon,

be known, it is easy to calculate the declination of the body, which would be seen on such a bearing.

Now, the declinations, and right ascensions of all heavenly bodies are always slowly and progressively altering; and consequently no star rises on exactly the same bearing, nor at the same time on any particular day of the year, as it did on the same day in any previous year. The alteration is small, but is known with considerable accuracy for all the principal stars:—for no two stars have precisely the same "precessional movement" and "proper motion," to which the changes in position are due. It is not difficult, therefore, having this knowledge, and having found the declination inferred in the bearing and altitude of an alignment, to state definitely the name of a star, with the appropriate year, day, and hour, when the alignment pointed to its rising. This is true also of the Sun and Moon, but a considerably less definite date is afforded by either of them: in the case of the Sun, as the rate of its change is so small; and in the case of the Moon, as it is so irregular. Even in the case of stars, though the movement is, generally speaking, sufficiently great, and sufficiently well known to be able to obtain a date within perhaps ten or twenty years of the truth, *accurate* observation of the alignment is necessary. A date can only be allotted within margins of, say, one hundred years in some cases, where the aligning menhirs have become only slightly shifted through some cause from their original positions; and where judgment has had, accordingly, to be exercised as to the correct theodolite reading of the bearing of the line. It will be obvious also, that the longer the alignment is,—the greater the distance is from the observation position to the end menhir of the line, or to the mountain peak, or cairn, seen against the sky, to which it exactly directs the eye—the more certain, and the more easily observed will be the bearing and altitude.

It may be objected that among the great multitude of stars it would be easy to find several that would have had, at various epochs, the declination ascertained from any particular alignment, and that the dates derived from such declination could thus land you into almost any century. The multitude of stars is, no doubt, great; but bright stars, and still more bright stars of particular conspicuousness (owing to their isolated position in the heavens, or colour, etc.), are remarkably few. And when the period in which we are to look for a date is limited, as for our purposes it must be, by that of the Christian era at one end, and the probability of the date of the beginning of the Stone Age in these islands, (to which period these megalithic monuments are allowed on all hands to belong), at the other, namely, between 3,000 and 4,000 B.C., and the first two or three centuries A.D., the chances of error are still more reduced.

In the description that follows I have, however, given the names and dates of *all* the bright stars whose declinations are inferrable from the "star-lines" that could have been observed along them, within the above limits of time, and discussed the probabilities as regards the dates thus derived.

I shall deal first with the two longer lines of stones trending to the north-

ward, "A east" and "A west," as giving the most definite results; firstly, on account of their length, which provides a dependable azimuth, and next because the northern end of each line is terminated by a high and conspicuous menhir, 4 or 5 feet taller than any of the other stones of the lines, which, therefore, give a definite object for observation.[1]

LINE "A EAST."

I shall first deal with the eastern of the two lines, which consists of eight stones. In order to determine its azimuth, I chose a spot to the southward, whence all the stones composing it came into alignment with the high menhir at its northern end, and there set up my theodolite. There seemed to be the foundations of a standing stone at this point, though no other vestige of it remained; but in any case, the azimuth was exactly obtainable from here, and is N. 9° 49′ 30″ E. This, with the hill-crest altitude seen along it of 1° 10′, produce a star with declination 32° 26′ 37″ N.

LINE "A WEST."

The western line consists of ten stones. The seven northern ones, including the tall terminal menhir, are, with one exception, still all in line; but the three nearest the circle are evidently either displaced or else never belonged to the line; for it is not now possible to get them into alignment with it. The six stones, however, that do remain *in situ* present a line, which, being produced across the circle, exactly strikes a tall menhir which stands some feet outside it to the south-westward; and I have little doubt that this important-looking stone was the original southern termination of the line, and still remains in position; while its companion for the southern end of the eastern line has disappeared.

The azimuth of "A west" from this position is N. 11° 10′ 0″ E., and this, with the hill-crest altitude seen along it of 1° 14′ 50″, produce a star with declination of 32° 28′ 12″ N.; a result so close to that derived from the "A east" alignment that there is no doubt that both directed to the same star, though, as will be seen, the two alignments are not parallel, differing as they do by $1\frac{1}{3}$° in bearing. The reason for this is as follows:—The rising path of the star with the above declination would not be vertically upwards, as seen at Callanish, but on the arc of a circle, with the pole of the heavens as centre; and thus would have an apparent movement, when first rising, from left to right; so that, as it increased its altitude, so

[1] All calculations in connection with the sun in the following pages are worked as for an observation of the sun's centre.

The declinations of stars, at various epochs, are taken from the tables in the first volume of *Handbuch der Mathematischen und Technischen Chronologie*, by Professor F. K. Ginzel, published in 1906.

it increased its angular distance from the pole. The observer, looking along "A east," which has the lesser altitude and smaller azimuth, was the first to see the star rising above that part of the hill-crest to which it directed. It was then still hidden from the observer looking along the other line of stones, but, a few moments later, the star emerged above the higher part of the hill-crest to which "A west" was directed, a little to the right of the "A east" spot, and completed the observation. The same star was, in fact, seen along each line, but at slightly differing positions of its path up the heavens.

The bright stars and dates to which this declination (32° 27′ N.) may refer are as follows:—

Capella in 1800 B.C.
Castor in 650 B.C.
Arcturus in 320 B.C.

For reasons to be discussed later, connected with the time of rising of this star, and also with the date to be derived from line D, it seems most likely that the star Capella, at its appropriate date, was the object of observation; but, astronomically speaking, each of these stars, and dates, has equal probabilities. I shall accordingly, for convenience, refer to these lines in future as the "Capella" lines; remarking, in passing, that alignments for this star have been found at various dates in several other prehistoric monuments in Great Britain.

This matter of the date does not exhaust the interest of these two lines, for if each alignment be produced sufficiently far to the southward, it will then be seen that the centre of the sepulchre and of its circular tumulus lies exactly on the middle line of the avenue formed by them; and besides this, the line of direction of the stones forming the dividing walls of the two burial vaults of the sepulchre is parallel to the avenue also. There can thus be little doubt that the double line of menhirs and the sepulchre are connected one with another, have the same astrological intention, and most likely were erected simultaneously. These connections, I may add, have only become apparent after the survey of the whole monument had been plotted on a sufficiently large scale, and is an instance of the scientific value of this method of examination. The fact that the centre of the tumulus lies on the central line of the avenue cannot otherwise be appreciated, nor is the parallelism of the long lines of stones forming the avenue with those of the sepulchre divisions apparent by casual observation.

The last point of interest concerning the "Capella" lines to which I would direct attention is the connection between them and the outlying stone standing at about 15 feet to the north-east of the circle. This is evidently a stone of importance. It is of regular form, with its sides made flat (or particularly chosen because they were naturally smooth and parallel), and has, when viewed in plan, one end square, but the other wedge shaped; the point of the wedge being directed to the south-westward. If its present attitude in the ground is that in which

it was originally "planted," it will be seen that it is directed exactly to the tall menhir standing 10 feet outside, and to the south-westward of the circle, which I have supposed to be the termination of the western "Capella" line; and this affords strong probability that the two stones are in connection one with another. Standing at this south-western stone, the azimuth of the north-eastern, combined with the altitude of the horizon seen beyond it (at a somewhat marked dip in the distant hills), produces a declination of 28° 10′ 25″ N.

When first reaching this result, I was somewhat puzzled as to its meaning, for I had fully expected that the direction given by the line would turn out to be for the solstitial sunrise, which would entail a declination of about 24° N. Obviously, therefore, it could not be a sun-line; nor does this declination belong to any *probable* star in "prehistoric" times except, perhaps, Pollux, in about 1200 B.C. The only heavenly body to which otherwise it could refer is the moon, and in view of the fact that I have obtained a similar declination, along undoubted sightlines, in several other monuments in other parts, I venture to put forward the following suggestion. The moon has a cycle of nineteen years (roughly), within which it changes its tropical declination from 28° to 18°, and back again to 28°. The rising of the full moon, when it is at its northern tropical declination, only occurs at or near the date of the winter solstice, and if the azimuth of this event, (full moon rise), were marked when the moon had reached its greatest possible declination of 28° N., this full moon rise would indicate the beginnings of periods of nineteen years, and also be closely connected with a definite solar event, viz., the winter solstice. This period of nineteen years is, as I need not point out, the Metonic Cycle of ancient Greece, though I do not know how, nor from what lunar event, it was there measured. The possibility of the agreement in this length of a calendrical cycle between the two countries is at least of interest, though, if I am right in my conjectures, it was observed in our islands in 1800 B.C., which antedates by nearly 1400 years its establishment in Greece, where it is said to have been initiated in 432 B.C. (see quotation on p. 31).

LINE B.

This line, composed of four menhirs, is constructed in a similar fashion to the two Capella-pointing lines, namely, of flat slabs placed in the ground in the direction of the line, and terminated by a taller menhir of nearly square section.

This end stone, and the next to it, are still upright; the other two between them and the circle, lean slightly to the northward, as may be seen in the photograph; which causes the bases, as plotted in the ground plan, to throw the line a little out in that direction, but it will be realized that if these two stones were standing upright all four would be exactly in a line. The azimuth of this line, combined with the altitude of the horizon along it, produce a declination of 0° 35′ 19″ N.: that is to say, for sunset at the day of equinox. Of that, there can be no doubt whatever.

LINE C.

This line is composed, at present, of five menhirs; but, by the gaps in it, evidently comprised, originally, at least three more.

From the southernmost of the stones still remaining in place, the line runs true north, within 1°, up to the great slab, about 14 feet high, which stands within the "circle," and as all three of the lines already discussed terminate in larger and distinctive pillar stones than those forming the rest of the line, it seems more likely that the eye was intended to be directed in this line, also, *towards* the important stone, rather than from it to the southward, where there is no trace of such a menhir.

I should add that near the southern end of line C there is a collection of enormous boulders, so enormous that their heaping together can scarcely be other than natural, though there is a sort of symmetry in their disposition, which renders an opposite view permissible. This group of boulders lies exactly on the continuation to the southward of line C, and, standing on the flat surface their top affords, one can suppose oneself to be at the observing position for an azimuth of true north, along the line to the great central menhir; but this is the merest conjecture, and has no great importance in itself, astronomically speaking. I am not prepared to say how this alignment to the true north was obtained by the ancients. Polaris (*α* Ursæ Minoris), the so-called "Pole Star" of our times (though it is not yet actually polar), had a declination of 68½° N. at the date of the monument given by the "Capella" lines (1800 B.C.); that is to say, it circled round the north pole of the heavens at a distance from it of 21½°. The ancients may have had sufficient knowledge to divide equally the distance between the eastern and western points of the circumpolar path of Polaris, in order to obtain its polar centre; or, facing the other way, a north and south line may have been laid out, by finding the meridian position of the sun (that is, when it bore due south), through the shortest length of the shadow thrown by the great menhir; but, whatever method was employed, the fact remains that the line of stones under discussion does present a practically true north and south bearing.

LINE D.

The stones of this line are somewhat disarranged from their original regularity, though not seriously, and it is not difficult to obtain a mean alignment, which shall include all the four stones very fairly. The azimuth of this alignment, combined with the altitude of the horizon seen along it, produce a declination of 6° 43′ N. which refers to the following stars and dates, viz.:—

Pleiades rising in 1750 B.C.
Spica in 1270 B.C.
α Arietis in 1130 B.C.
Aldebaran in 800 B.C.

FIG. 2.


TRUE NORTH
LINE A West
Capella rising 1800 B.C.
LINE A. East
Capella rising 1800 B.C.
Paved roadway, apparently modern
Central line of Avenue and Tumulus
FULL MOON RISE
LINE OF
Extreme North Declination
(19 year cycle)
THE GREAT CIRCLE
TUMULUS & SEPULCHRE
THE GREAT MEN HIR
Entrance-way to Sepulchre
Observer's position.
LINE B.
Equinoctial
Sunset
LINE D.
Pleiades
rising etc.
B.C. 1750
End stone of Line A West.
LINE C
North, over Great Menhir
SCALE
(HORIZONTAL & VERTICAL)
10 feet 0 10 20 30 40 50 100 150 feet
HEBRIDES
ISLE OF LEWIS
CALLANISH
SEPULCHRAL TUMULUS WITH ITS ALIGNMENTS, & "GREAT CIRCLE"
(Gaelic: "Tursachan Challanish")
1909
Shewing Plan of the Stones at present ground-level, and
Views of faces of those forming Alignments,
each abreast of its plotted position in plan:
all being on the same vertical and horizontal scale.
Boyle T. Somerville
The stones have been numbered consecutively for convenience of reference

The astronomical probabilities of each of these four stars is equal in degree; but it should be remarked that *α* Arietis is not at all conspicuous in the heavens, either by position or brilliancy; though it must not be forgotten either that this star, or rather the constellation to which it belongs, had great importance in the astronomy of eastern countries in early days; marking as it did the sun's entry at springtime on a new year—the term, indeed, persists to our own day; the sun still being said to be at "the first point of Aries," when it is at the spring equinox, though the actual coincidence of *α* Arietis with the equinox has not occurred since the fourth century B.C.

Taking the Pleiades date of 1750 B.C., it would make the building of this line practically contemporaneous with the two long Capella lines, which, from the similarity in size and description of their stones, is in the highest degree probable, whatever their date. I would even go farther, and say that the Pleiades star-date forms a valuable check on the accuracy of the Capella star-date for the founding of the monument. But the Spica date of 1250 B.C. and the Aldebaran date of 800 B.C. are just as astronomically probable, though neither is supported by the date given by another line, in the same way as that of the Pleiades.

I would now call attention to the fact that line D, the "Pleiades line"—if I may so name it—and the "Equinoctial line" (line B), if produced towards one another, meet at a point on the central line of the tumulus covering the sepulchre, at its southern edge which is *exactly* equidistant, namely, in each case, 69 feet 6 inches from the terminal stones of lines B and D (see Fig. 2). A single position is thus afforded from which an observation can be made along both these lines: a position, too, which is symmetrical with the tumulus and the two Capella lines, lying as it does on the central line of the avenue formed by them. This connection between the equinox and the rising of the Pleiades is of particular interest in the light of the following well-known quotation from Diodorus Siculus concerning the "Hyperboreans." The first part of the quotation, bearing on the Metonic Cycle, has already been cited (*vide supra*).[1]

Quotation.

(Diodorus Siculus, ii, 47, ed. Didot, p. 116.)

"It is also said that in this Island (*i.e.*, that of the Hyperboreans) the moon appears very near to the earth; that certain eminences of a terrestrial form are plainly seen upon it; that the god (Apollo) visits the Island once in a course of nineteen years, in which period the stars complete their revolutions, and for this reason the Greeks distinguish the Cycle of nineteen years by the name of the Great Year. During the season of his appearance the god plays upon the harp,

[1] It is, I understand, by no means certain that the "Island" of the "Hyperboreans" refers, definitely, to Britain; but the quotation clearly points to some race inhabiting a country northward of Greece, where solar and stellar observations, of a religious character, were made in early days.

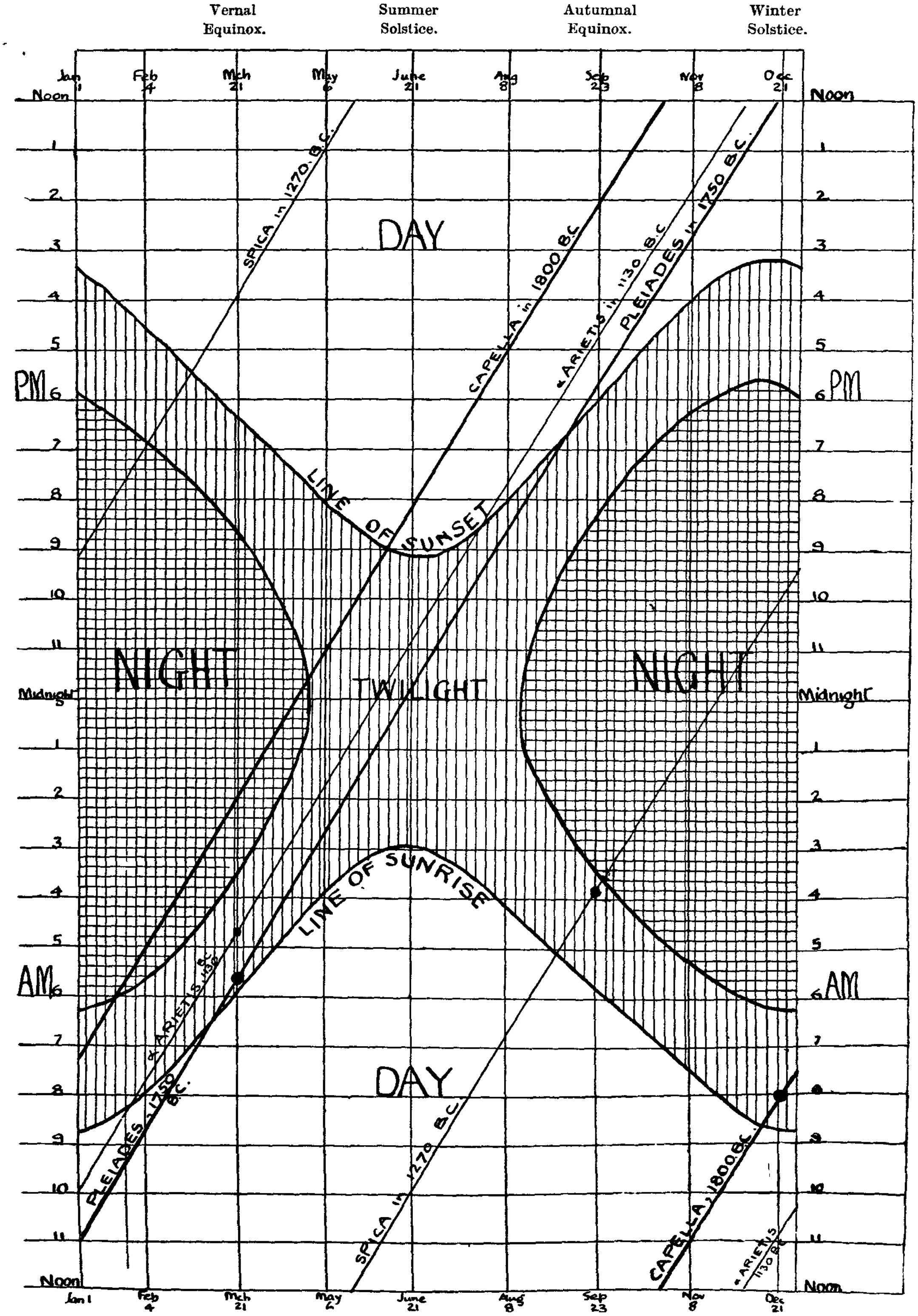


FIG. 3.—Diagram of the conditions of DAYLIGHT, TWILIGHT, AND DARKNESS throughout a year in Latitude 58° N. (*Callanish*) combined with the TIMES OF RISING OF CERTAIN STARS AT GIVEN DATES throughout the same period, at same Latitude.

the spaces between the tall stones of the "circle" and defining its outline, but now only to be traced in the western part of the ring.

The enquiry so far refers us to certain stars and their dates, as obtained from their declinations. But there is another point to be considered, namely, the time of year at which the inferred stars thus rose, at the epochs to which they belong.

Without entering deeply into astronomical facts, it should be stated that while stars rise on the same *bearing* (practically), on every day throughout the year, their *time* of rising alters, for they appear about four minutes earlier on the horizon of the observer on each successive occasion. It will thus be realized that the rising of any particular star can only actually be *seen* during a certain part of the year, namely, for the period that it rises between sunset and sunrise; or rather between the end of evening twilight and the beginning of morning twilight.

The accompanying diagram (Fig. 3) represents in pictorial form the varying conditions of daylight, twilight, and darkness, throughout a year at the latitude of Callanish. The diagonal lines running across the diagram show, at their points of intersection with the others, the actual time of rising of the star whose name they bear, at different times of the year; namely, of Capella in 1800 B.C., of the Pleiades in 1750 B.C., and of Spica in 1270 B.C.

I will deal first with Capella in 1800 B.C. It will be seen in the diagram that at that date it rose just before sunrise at the winter solstice. It rose in darkness thenceforward, earlier and earlier each night, until the middle of May: when it rose about one hour after sunset. Subsequently to that it rose in daylight until the following winter solstice; but it was visible every night, at some part of its course.

This connection between Capella-rise and the winter solstitial sunrise is important; for the observation of the rising of the full moon every nineteen years (discussed at p. 29) always takes place at this (the Saturnalian) time of the year; and the "heliacal" rising of Capella would thus have "warned" both these great solar and lunar events. Hence, perhaps, the greater length, and the important terminal menhirs given to these two lines of stones.

An interesting fact in connection with Capella, as seen from Callanish in 1800 B.C., must now be stated.

In this year, at that latitude, Capella performed its path round the pole at a distance from it of 57° 33′. At Callanish, the north pole of the heavens is elevated 58° 12′ above the horizon; so that Capella, when at the lowest point of its path, was some 39′ above the horizon, and thus never set below nor rose above it: it was "circumpolar," as it is termed. But the skyline of the hills towards which the long lines of stones is directed, is elevated 1° 14′ 50″, so that Capella was obscured from sight by the hills, when at the lower part of its course, just as much as if it had sunk below the sea horizon; and thus its "rising" actually could have been observed, only it was above a hill horizon, instead of a sea horizon.

By about 1700 B.C., a hundred years after the date that I have assigned to the erection of these lines of stones, the declination of Capella would have altered

sufficiently to cause this apparent "rising" to cease; and Capella would then always be in sight at night, circling round the pole. Alignments for Capella have been found in several prehistoric monuments, and it is conjectured that its circumpolar movement may perhaps have been utilized for calculating the time at night, just as the attitude of the constellation of the Great Bear in its swing round the Pole Star is used as a "shepherd's clock" at the present day.

As regards the other star alignment, that to the eastward, it may have been the Pleiades, in 1750 B.C. as stated above, or, with equal astronomical probability, the star Spica (α Virginis) in 1270 B.C. If the Pleiades, this group rose in bright twilight—too bright for observation—at 5.37 a.m., or about twenty minutes before the sun, on March 21st, but was *visible* as a rising body from April 10th onwards, until the middle of August, when it rose just as the sun set. For the rest of the year the rising of the Pleiades took place in daylight, and was consequently invisible.

If the star, on the other hand, was Spica in 1270 B.C., it rose in that year at one and a half hours before the sun at the autumnal equinox, thus "warning" that event, and as the opposite radiating arm of the "cross" to this we are now considering pointed to the sunset of the same date, there seems some possibility that Spica, (with its appropriate date), was the heavenly body for which this alignment was laid out; or, in the course of the centuries, it may have succeeded the Pleiades as a date-fixer for the "dancing" of Apollo. Spica was visible as a rising body during the winter months, from September 21st to the middle of February, when it rose at about one hour after sunset. During the rest of the year its rising took place in daylight.

SUMMARY.

Before summarizing the particular inferences to be derived from each feature of Tursachan Challanish, I wish to point out a general inference, which should set at rest any doubts as to the reality of the factors of astronomy and orientation in this ancient monument.

For what is Orientation, or Direction? What is the meaning of North, South, East, or West? How did we derive these fixed points to start with?

Not from any local or national origin; for pure Direction is entirely independent of locality; it is, in fact, derived solely from the movements of the "heavens." It is only by reference to the positions of the stars, sun, or moon, that Azimuth, or true Direction, exists: there is no other meaning in the term.

So that when, in the monument just described, we find two lines of megaliths laid out on absolute "cardinal points," viz., West and South, the setting and nooning points respectively, we realize that it can only have been accomplished by some reference to the heavenly bodies: (magnetic compasses, and their divergences from the true meridian presumably being unknown in those days).

And if these two lines of stones could so be laid out (and I think that no one,

can suppose that their directions are due to mere chance), the inference is irresistible that the others also are astronomically aligned, though for what purpose we are not able definitely to say.

We may summarize, therefore, the results of the preceding investigation as follows :—

(1) There is a single point, situated on the southern edge of the tumulus covering the now exposed sepulchre, from which an observer finds himself aligned by lines of megaliths for the equinoctial sunset along line D, for the rising of Capella along the central line of the avenue formed by lines "A east" and "A west," and for the rising of the Pleiades along line D: the two latter events during the epoch 1800 to 1750 B.C.

(2) Line C is laid out on a true north and south line with the Great Menhir erected at the western edge of the tumulus. All the alignments, therefore, are connected with the sepulchre as their point of origin.

(3) Evidence possibly exists, from the direction of the line joining the two outlying menhirs, of the observation of moon-rise when it is Full Moon at the extreme northern tropical point of its path, occurring every nineteen years; thus marking that epoch.

(4) The Great Circle, besides being constructed of megaliths of a different, and much larger type from the others, is placed entirely asymmetrically to the remainder of the group: and is, therefore, probably a later, and possibly an alien construction, intended to invalidate, or to mar the astrologically auspicious qualities of the alignments.

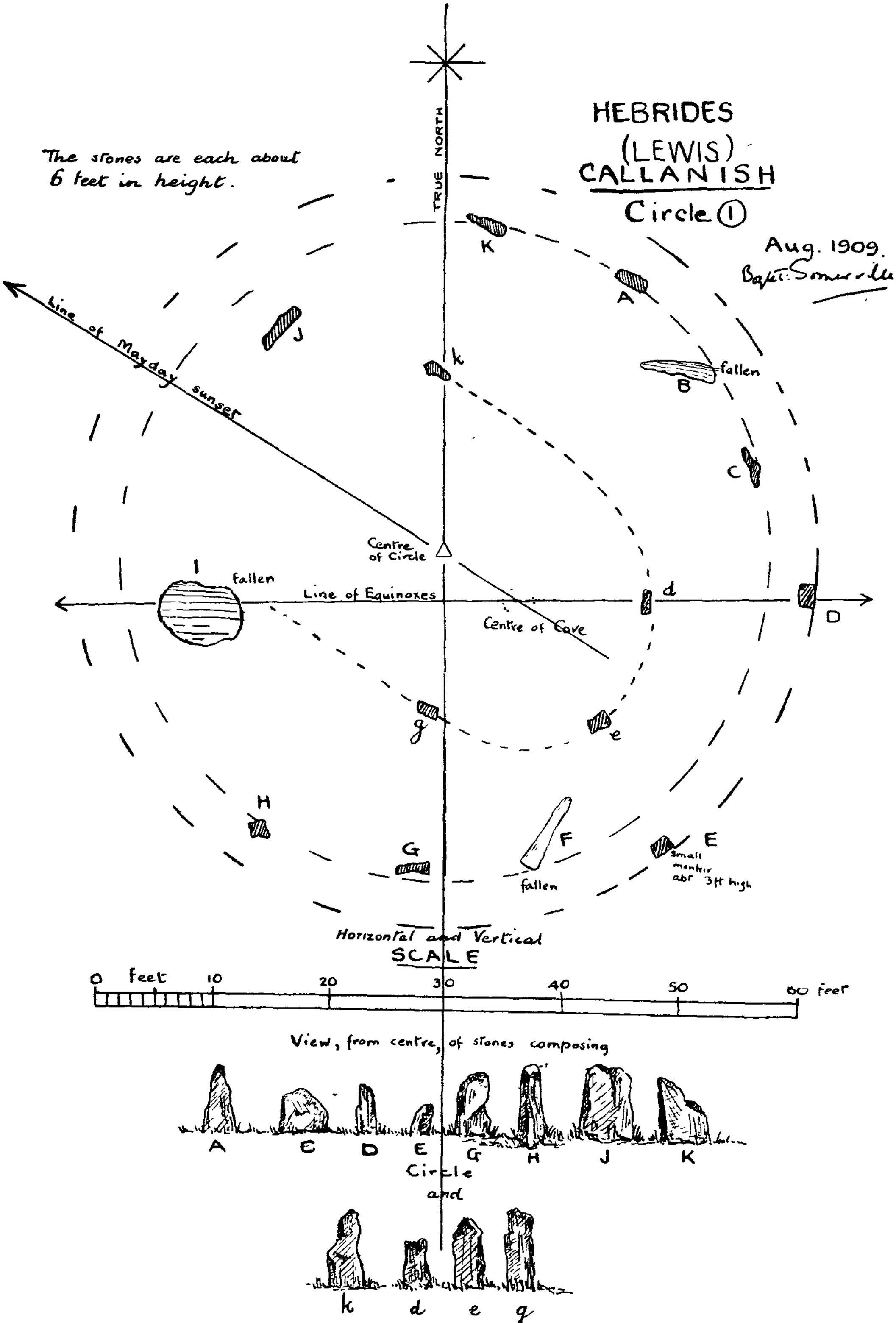
II.—The Smaller Circles at Callanish and Vicinity.

There are at least four circles standing in the neighbourhood of the great and complex monument described above; and though these are all in a much ruined state, some reference to them may be of interest.

Their positions and attitude towards the great circle can best be realized from the map of the district appended. Two of them are quite accessible to the tourist who makes the expedition to Callanish from Stornoway, as they are close to the road, and meet the eye at once, each standing on its little eminence.

I have numbered these, for convenience of reference, as (1) and (2). Circle No. (3) is also at no great distance from the road, but is more out of the beaten track, being about a mile beyond the Garry na Hine Hotel, on the side road that leads past it, to the southward.

Circle No. (4) is farther off, and is most easily reached by boat, as it entails a very roundabout journey by road to get anywhere near it.



TRUE NORTH
HEBRIDES
(LEWIS)
CALLANISH
Circle (1)
Aug. 1909.
The stones are each about
6 feet in height.
Line of Mayday sunset
K
A
J
k
fallen
B
C
Centre of Circle
I
fallen
Line of Equinoxes
d
D
Centre of Cove
g
e
H
G
F
fallen
E
Small menhir abt 3ft high
Horizontal and Vertical
SCALE
0 feet 10 20 30 40 50 60 feet
View, from centre, of stones composing
A C D E G H J K
Circle
and
k d e g
Cove

FIG. 4.

Circle No. (1). (Fig. 4.)

This monument at present consists of a circle of about 56 feet in diameter, composed of eleven monoliths (three of which have fallen), enclosing what appears to have been a "cove," of which four stones remain in place. The "circle" is not a regular figure, as it now stands, but six of the stones forming it, which remain erect, stand on a truly circular line; the other three erect stones being placed a few feet inside and outside the circle as derived from the first named. Judging by the distances between the stones still standing, the whole circle was probably originally formed by fifteen stones.

Whether the irregular ones have been thus placed purposely, or so as to avoid the necessity of cutting a hole for a foundation beneath the surface soil into rock, or whether the irregularity is due to displacement through earth-movements since the circle was erected, is not possible to decide from surface appearances, though excavation might partly decide it.

The seeming irregularity might point, possibly, to there having originally been an inner and an outer "wall" of great stones, enclosing between them an earth bank, somewhat in the fashion of those described by Mr. A. L. Lewis as occurring at Lough Gur, in County Limerick, Ireland. It may be recalled (see p. 33) that there was the remnant of an enclosing "wall" of small stones, filling the spaces between the monoliths of the Great Circle; so that the idea is not foreign to the neighbourhood.

The "cove," as I conceive it, is also rather irregular; but seems to have been directed more or less towards the sunset of May Day, which is known to have had importance as a festival day in pagan times. There are no traces of a burial within this circle, though it is not impossible that one so existed in former times. There are several cairns visible on the hill-crests around the horizon. I was informed by a native of the place that many, if not all, of these are quite modern; for the building of cairns forms a sort of pastime for the boys tending sheep on the hill-sides; and without actually visiting each of them, it would be impossible to say which had an archæological import, and which not; though it is quite possible that some are ancient, and intended to indicate an astronomical alignment.

No outlying stone or row of stones now exists near this circle from which to derive any astronomical purposes in connection with it.

Circle No. (2). (Fig. 5.)

This circle stands on a small plateau a little below the first, and is in an even more ruinous state, as only five of its megaliths remain standing, and three fallen. The original number was probably thirteen. Those *in situ* stand on the circumference of a circle 67 feet in diameter.

A ruined sepulchre, of irregular shape, which once was probably circular, is placed, not in the centre of the circle, but inclined towards the north-eastern

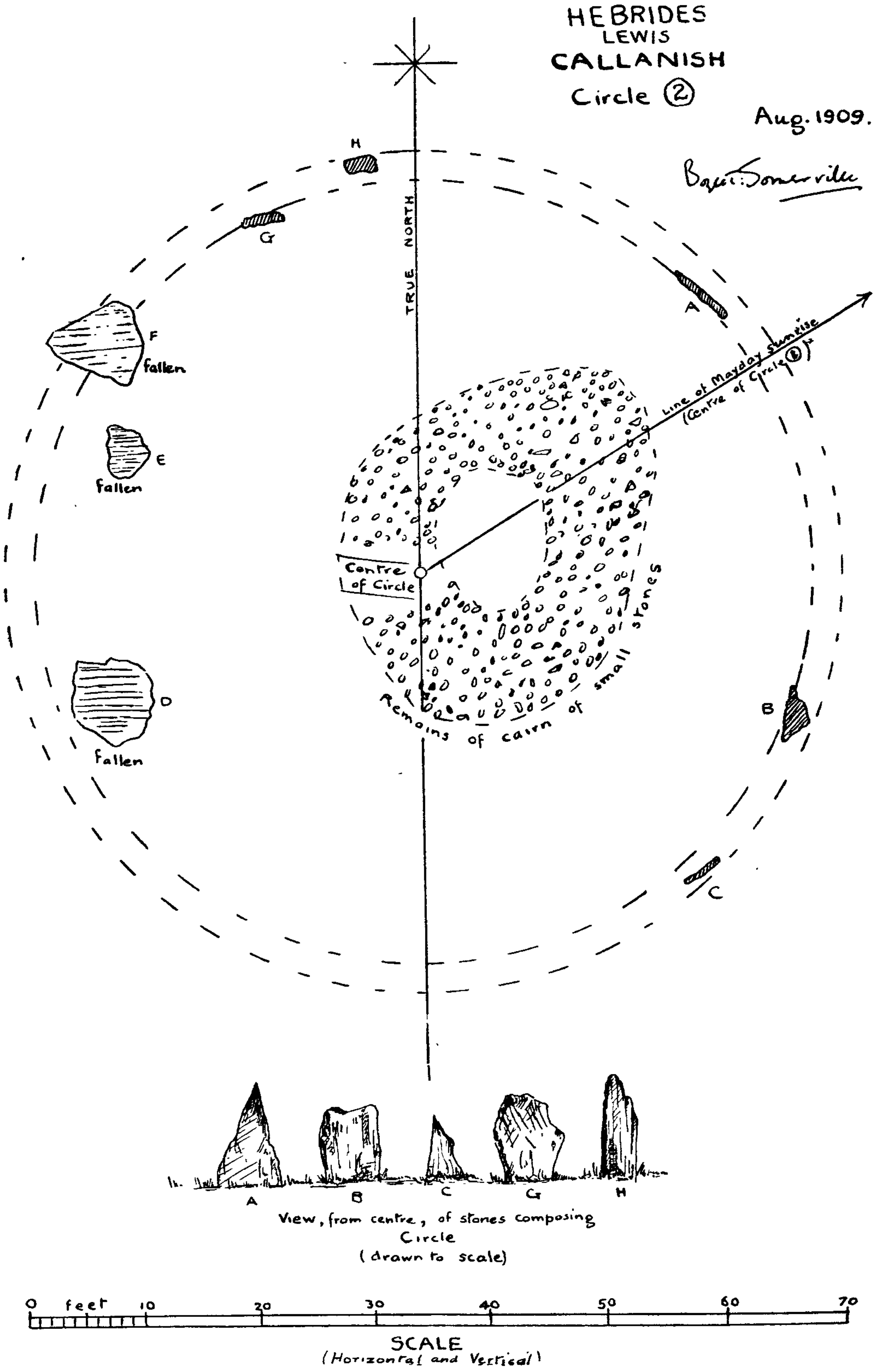

HEBRIDES
LEWIS
CALLANISH
Circle ②
Aug. 1909.
Boyle Somerville
TRUE NORTH
H
G
A
F
fallen
E
fallen
D
fallen
B
C
Line of Mayday sunrise
(Centre of Circle ①)
Centre of Circle
Remains of cairn of small stones
A
B
C
G
H
View, from centre, of stones composing Circle (drawn to scale)
0 feet 10 20 30 40 50 60 70
SCALE
(Horizontal and Vertical)

FIG. 5.

quadrant. There is no trace left of any burial cist at its centre. The ring of small stones, 7 to 8 feet wide, that indicates the site is about 25 feet in diameter, and stands a few inches above the soil.

Any connections between this circle and the many cairns on the surrounding hill-tops labour under the same doubtfulness as those described under Circle (1), and are not worth entering into; but the centre of the first-named circle is exactly on the line of sunrise of May Day, from the centre of the second; and one must conclude that this is probably intentional. I cannot find any connection of astronomical import between either the first or second circles with the Great Circle; which is more strange, since it is easily visible, and, of course, very conspicuous from each of them; appearing as a regular forest of tall stones cresting the ridge.

Circle No. (2), besides being somewhat larger in diameter than No. (1), is also composed of more remarkable stones; those remaining being from 6 to 9 feet in height; that lettered "A" in the plan being especially conspicuous, with a wide base, tapering to a pointed top. From the centre of the circle this stone lies exactly on the line of summer solstitial sunrise, to mark which may possibly have been its original intention.

CIRCLE No. (3). (FIG. 6.)

Circle No. (3) is at about a mile along the road that turns down past the Garry na Hine Hotel from the main Stornoway road. It is on the right-hand side, at about 150 yards from the road, near, but not actually on, the summit of a heathery hill, named Sron a' Chail (? "The Hag's Nose").

There is yet another circle, on the hill-side almost opposite this one, on the left-hand side of the road, from which it is distant 500 yards; but I was prevented from visiting it, owing to a sudden bad turn in the weather, through which my examination of No. (3) circle was completed only under great difficulties, in wind and drenching rain.

No. (3) has five stones remaining in its circumference, which was originally formed, perhaps, by seven. Three of these are placed on the circumference of a circle 36 feet in diameter; the other two on a concentric circle 42 feet in diameter with the line joining them directed towards the Great Circle of Callanish, easily visible, distant two miles. In the north-western quadrant there is the remains of an oval band of small stones, forming an enclosure, in the middle of which is a small standing stone slab, 2 feet 6 inches high, which is planted in the ground on a line N. 22° W. and S. 22° E., or roughly, also in the direction of the Great Circle; but this is all that remains of the burial cist. The soil is marshy, and there is an accumulation of peat, three or four feet deep, surrounding the circle, which has been removed within its circuit to the original ground level. The stones composing the circle are all large and vary from 7 to 10 feet in height. That marked "A," which directs the eye from stone D across the circle to the Great

Circle, is especially noticeable:—a massive pillar stone, 8 feet in height, with a pyramidal top and well-trimmed sides and angles.

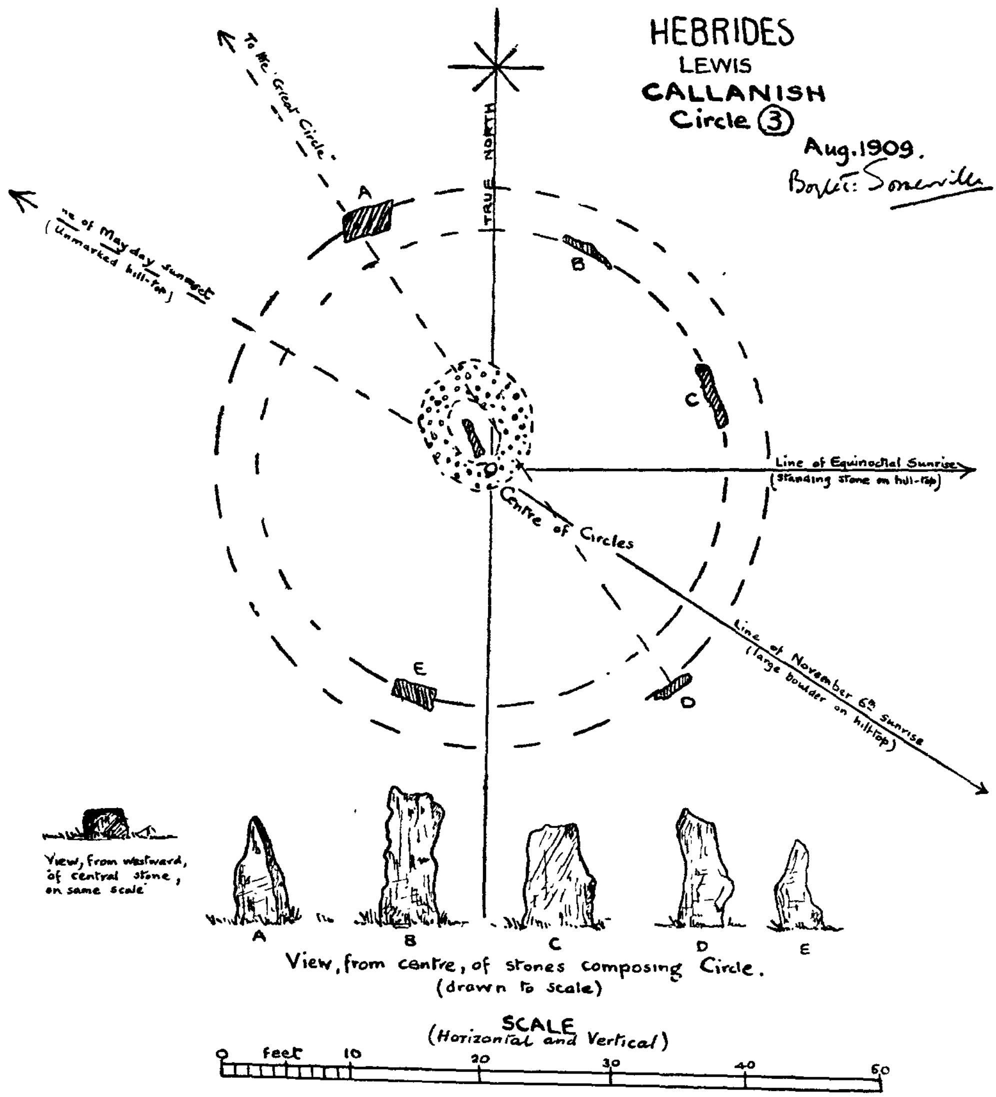


FIG. 6.

The following astronomical events are observable from this circle on the surrounding horizon line, as seen from its centre, by bearings of objects; two of which are of an artificial nature. I do not take into account cairns, for the reasons before stated:—

(*a*) Two standing stones on the skyline of a hilltop at some considerable distance, (more than a mile), which may possibly form part of a ruined circle. Bearing 89° 51′, elevation 0° 20′ 00″, giving declination 0° 12′ N., or sunrise on the day of the Equinox.

(*b*) Large boulder on a skyline hilltop, distant about one mile. Bearing

122° 13′, elevation 0° 34′ 30″, giving a declination of 15° 57′ S., or sunrise on November 6th.

(*c*) A small hilltop plateau, a few miles away, which is almost exactly level with the distant skyline horizon of hills as seen from the circle. Bearing 299° 03′, elevation 0° 06′ 30″, giving a declination of 14° 50′ N., or sunset on May 1st.

NOTE.—As this hilltop is not artificially marked, this alignment should perhaps be looked upon as fortuitous: but the *astronomical* fact is undoubted; and as this was anciently an important calendrical or religious date, it probably was an intentional alignment. I may remark that I have found in other places this arrangement of an alignment, at which the near and distant horizon of hilltops appear superposed or nearly so; or, sometimes, of a near horizon cutting off, as it were, the summit of a distant hill.

CIRCLE NO. (4). (FIG. 7.)

The only other megalithic monument in the neighbourhood of Callanish that I was able to visit is situated on the edge of a perpendicular cliff, about 50 feet high, on the north side of the narrow channel separating Great Bernera Island from the main island (Lewis). Four stones remain out of what were probably originally seven. Of these three are standing, the other having fallen over, apparently more or less recently; yet, ruined as it is, this monument possesses singular interest from the fact that it is not a "circle," as for convenience I have styled it, but a semicircle, with a diameter of about 68 feet (see plan).

It is, of course, possible that the cliff may have subsided since the date of the erection of the whole circle, though there is no appearance, by fallen débris, or of a new surface to the rock precipice below, (for it is of *rock*), that this has taken place. But if there has been a subsidence, it is at least remarkable that the straight edge of the cliff-top, after the occurrence, should form practically the exact east and west (true) diameter of the circle, so that the centre of the remaining semicircle should be on a small irregular hummock of rock, a foot or so inside the edge.

There is no trace on the ground surface of a burial within its limits.

There are observable from the centre of the semicircle several interesting astronomical alignments, all solar.

I must here make a short digression to refer to a feature which I have found in several places in connection with the outlook round the horizon of ancient monuments, not only at this particular one, but elsewhere. This is the occurrence of large and massive boulders of rock on the sky-lines of the hills surrounding the monument, but not necessarily on their summits; and as I have found that many of them are on particular alignments of the rising or setting of the heavenly bodies, sun, moon, or certain stars, I cannot but suppose that some, at least, have

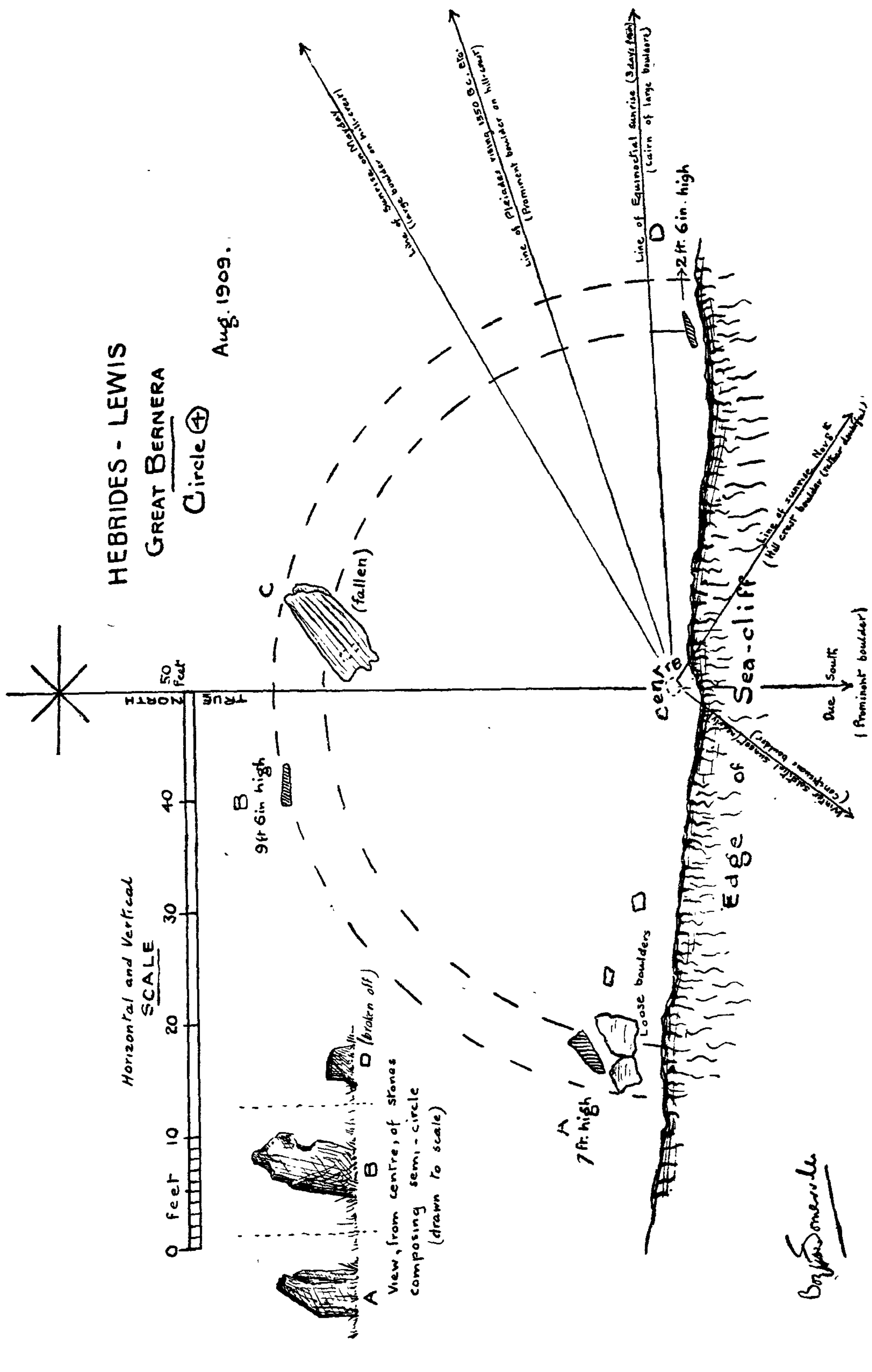

HEBRIDES - LEWIS
GREAT BERNERA
Circle 4
Aug. 1909.
Horizontal and Vertical
SCALE
feet
TRUE NORTH
C
(fallen)
B
9 ft 6 in high
A
7 ft. high
D
2 ft. 6 in. high
Loose boulders
Centre
Edge of Sea-cliff
Due South
(Prominent boulder)
Line of Sunrise on Mayday
Line of Pleiades rising 1350 B.C. etc.
(Prominent boulder on hill-crest)
Line of Equinoctial sunrise
(Cairn of large boulders)
View, from centre, of stones
composing semi-circle
(drawn to scale)
(broken off)

FIG. 7.

actually so been placed, in order to form the terminal point of the alignments, or else that the monument itself—the point of observation—has been erected so that any particularly conspicuous hill-crest boulder should be on the correct bearing from it. It does not follow that because *every* boulder visible from a monument on the sky-line is not on an astronomical alignment, that the occurrence is fortuitous when it does so happen; for it is quite possible that while some of those in sight from a particular monument are in connection with it, the other boulders may easily be connected with other monuments in the vicinity, each of which would, of course, require some alignment mark; and it would be very improbable that the boulders that would suit one point of observation would be correctly placed for another. Boulders perched on a hill-crest are not in themselves very common objects; and when, from the central point of a circle, one is seen conspicuously standing out as a dark point against the bright sky, and when its bearing and elevation produces, (for example), the solstitial declination, the inference is almost irresistible that it was placed there in order to indicate the sunrise, or sunset, of that date; or, as I suggest above, if the boulder should have been too massive for transportation (even for those who could carry into position, and erect, the immensely heavy monoliths of the great circle of Callanish), that the required monument was placed so as to take advantage of the naturally placed boulder.

I have already referred to such a boulder "fore-sight" (as we may term it, from its resemblance to the uses of the fore-sight of a rifle or gun) when discussing No. 3 Circle, and I know of other examples at Carloway, (not far from Callanish) at Lochboisdale, (in the Hebridean Isle of South Uist), at St. Kilda, and in the Lough Swilly district in County Donegal, Ireland.[1]

I will now continue my remarks on the Semicircle No. 4, and enumerate the astronomical events observable in the alignments to hill-crest boulders seen from its central spot:—

(*a*) Large boulder on hilltop, bearing 60° 21′, elevated 1° 30′ 00″, producing declination 16° 22′ N., or sunrise on May 6th.

(*b*) Prominent boulder, bearing 74° 01′, elevated 1° 04′ 00″, producing declination 8° 54′ 49″ N., or

Rising of	Pleiades	in 1350 B.C.
„ „	Spica	„ 1700 B.C.
„ „	α Arietis	„ 740 B.C.
„ „	Aldebaran	„ 310 B.C.

(NOTE.—The two last stars must be looked upon as doubtful, as producing dates possibly too recent for the style of monument; though not necessarily so.)

[1] The latter is actually propped up with smaller stones, in order to make it stand up prominently. Its artificial attitude is undoubted, though I was unable to find any trace of the monument with which, presumably, it once was connected.

(*c*) Large boulders heaped into a cairn on hilltop, and, from their size, evidently ancient, bearing 88° 04′, elevated 0° 46′ 00″, producing declination 1° 33′ N. Sunrise of March 25th and September 19th was thus indicated; no doubt intended for the Equinoxes, being about three days off in each case.

(*d*) Boulder (not very conspicuous), bearing 124° 45′, elevated 1° 27′ 00″, producing declination 16° 15′ S., or sunrise of November 8th.

(*e*) Prominent boulder on hill-crest, bearing 180° 10′, elevated 1° 22′ 00″, producing the true meridian of the circle (due south).

(*f*) Conspicuous boulder on hill-crest, bearing 218° 00′, elevated 1° 22′ 00″, producing declination 23° 18′ 37″ S., or sunset on December 16th and 28th, namely, six days before and after the day of winter solstice. (The hills were too hazy further on to the westward to permit of observations in that direction.)

III.—ISLAND OF ST. KILDA.

The Island of St. Kilda, which is separated by about forty miles of stormy water from the nearest part of Harris, in the Hebrides, was evidently inhabited in prehistoric times, (judging by the remains now to be described), in spite of its remoteness and difficulty of access. That they were able to sustain life in that desolate spot seems to point almost inevitably to the existence of the use by the inhabitants of domestic animals, such as sheep, for food; and, indeed, a small flock of "aboriginal" sheep, which greatly differ both in size and colour from the modern variety, persist there to the present day; being preserved by the owner of the islands on Soay, one of the three islets forming the St. Kilda group.

The boats of prehistoric times must have been of a superior build also to have reached the island at all, and the fact of their employment argues some considerable advance in the art of navigation.

I have discovered the remains of at least two prehistoric structures on the Island of St. Kilda, and I have no doubt that the stones of others are built into the walls of the houses of the little settlement of about seventy souls, who now inhabit the place.

The two monuments of which I speak, which, so far as I am aware, are new to science, are dolmens. They are situated at the south-eastern corner of St. Kilda, about 200 yards from one another. No. 1 is on the very edge of the sea cliff, about 350 feet high; indeed, in a sense, it overhangs the cliff, for it is erected on the top of a sort of "pulpit" of rock that projects from the top of the otherwise perpendicular cliff, while No. 2 is in a less giddy position, several feet inside the edge, and on comparatively level grassy ground.

DOLMEN NO. (1). (FIG. 8, AND PLATE VIII, VIEWS A AND B.)

This dolmen consists, as may be seen in the photograph and plan, of a triangular, flat-faced slab of stone, one side of which is supported on the natural

surface of the rock, which slopes upwards; the other propped on two other flat slabs, in such a manner that the top surface is roughly level; the whole being erected on the top of the projection of the cliff edge, to which I have just referred.

The space left beneath the capstone is only a few inches in height above the rock surface and altogether too limited in area for the placing in it of a body, or even of a jar of cremated remains. The object of the dolmen appears to have been entirely for observation purposes.

The capstone is, as has been said, triangular, with two long, nearly equal sides, and a shorter base. Standing at the centre of the base, (Plate VIII, View A), it is seen that the apex is directed towards a hilltop less than a mile away, which is marked—obviously by the hand of man—with a pointed boulder, supported on others, in the manner seen in the photograph (Plate VIII, View B). This presents a near view of it, but is taken from the same aspect. There is no doubt, when standing at the base of the dolmen, and looking along its length to the point, that this remarkable object is that to which an observer is intended to cast his vision.

The bearing is 309° 22′, and the altitude 8° 44′. This produces a declination of 28° 32′ N., and possibly refers to the setting moon, at its extreme tropic declination, marking an epoch of nineteen years (see p. 29, where a similar declination, obtained at the Great Circle of Callanish, is discussed).

I should add, however, that (with equal astronomic probability) it might refer to the following star, namely, Pollux, in 1200 B.C.

DOLMEN NO. (2). (PLATE IX, VIEWS A AND B.)

This dolmen is of a somewhat different character from that just described. A large number of biggish boulders have been assembled into a shape roughly oval in plan, and 25 feet in length. They are not heaped one on the other, but placed near one another on a piece of rising ground, near the edge of the cliff. At the southern end of the "oval," that is, at its highest part, a large rough boulder is supported, at a height of about 1 foot 6 inches from the ground, on two of the boulders of the group, and at its northern end by a natural projection of the rock surface. The space thus roofed over is about 6 feet long, 3 feet wide, and 1 foot 6 inches high—of a suitable size and shape, therefore, to contain a body; though inhumation would not be possible, the ground having a flat rock surface (Plate IX, View A).

The capstone lies with its long side in the direction of the main axis of the "oval": and looking along it to the southward, the eye is directed towards an object so fantastic and remarkable that, placed as it is on the very edge of a tremendous precipice, 450 feet high, I cannot suppose it to be other than natural, though it has all the appearance of being artificial.

The photograph, (Plate IX, View B), which was taken at a distance of about 30 feet, gives an excellent representation of this strange "window," formed by the supporting of a great slab of stone, 8 feet 6 inches long, 7 feet 5 inches wide, 2 feet

6 inches thick, on two natural supports of rock about 7 feet high. Not more than a couple of inches of holding keep it in its place at either end; yet it has stood, one must suppose, thus, for many centuries at least, the terrific fierceness of the squalls, and pressure of the winter gales, for which St. Kilda is so renowned.

The natives have a name for this object, which, pronounced as it is, something like "slain deal," I gather (from a Gaelic dictionary) to be "sleamhain diollaith"—the "slippery saddle"—which is a fairly descriptive title.

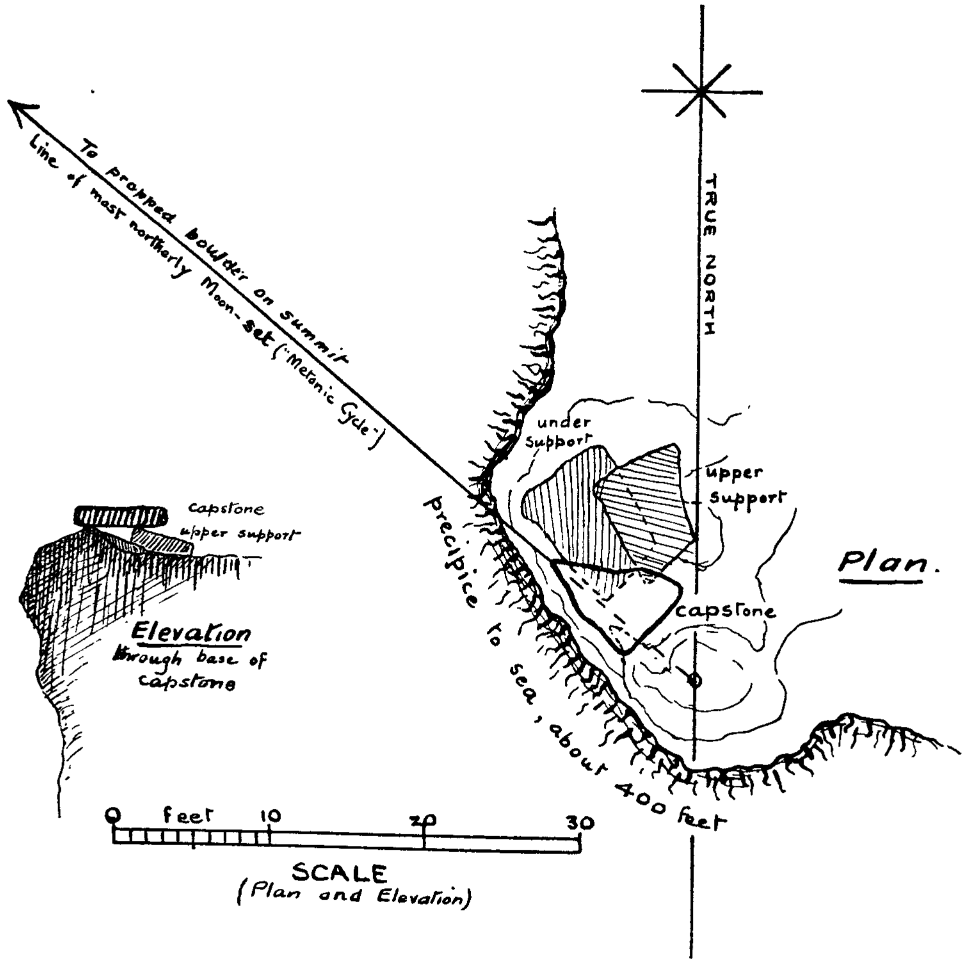


FIG. 8.—ST. KILDA ISLAND.
Dolmen 1.—*Aug.* 1909.

The photograph of the dolmen, which is taken in the direction in which it is pointing, shows the great window as being exactly in the same line, and is obviously the object used as a "foresight"; the heavenly body being seen through it.

The bearing of this line is 165° 50′, and the altitude 9° 05′, which produce a declination of 22° 13′ S.

One star to which this could be referred is Sirius (*a* Canis Majoris) in about 2500 B.C. There is nothing inherently improbable in this (except that the date

seems unusually remote for a British monument), for it is known that this star was employed in ancient Egypt, to "warn" the summer solstice at a date anterior to that given above. The only other star is Rigel (*a* Orionis), in about 2300 B.C., and, astronomically speaking, this is equally likely.

But what appears to me to be as more probable than either of these is that the alignment was for the sun, at about eighteen days before the winter solstice. In various parts of Wales, such an anticipation of the actual solstitial date has been discovered in several monuments, and the celebrated "Friar's Heel" stone at Stonehenge seems to have been erected so as to give warning by several days of the actual day of the solstice.[1]

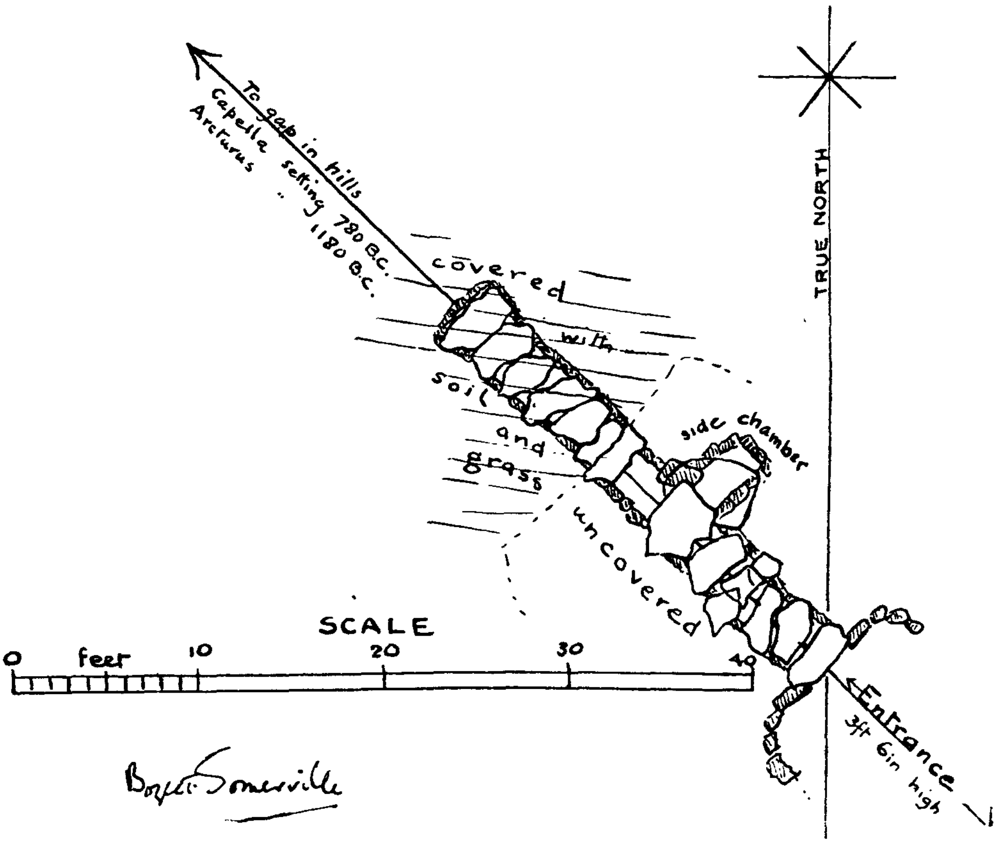


FIG. 9.—ST. KILDA ISLAND.
"The Fairy House."—August, 1909.

The covering flagstones at present exposed are a few inches below the soil-level; and are supported on a dry-walling about 3′ 6″ high, over an earth floor: the whole thus being subterranean.

[1] A relic of this "anticipation" is said to remain to us in the date of Advent Sunday, which falls at about three weeks before Christmas Day. Just as the latter is considered to be the Christianized version of the pagan midwinter (solstitial) festival; so may we suppose that Advent supplanted a pagan day on which preparation for the great feast may have begun.

THE FAIRY HOUSE. (FIG. 9, AND PLATE VIII, VIEW C.)

There is also on St. Kilda another relic of the prehistoric age, in the shape of an *allée couverte,* named "The Fairy House," which was unearthed, so I was informed by one of the inhabitants, about forty years ago, when the soil above it was being dug over for sowing. It yielded, my informant stated, a bronze weapon of some sort, some burnt bones, and some broken pottery, which, he understood, were in a museum in Scotland. The name ("The Fairy House") seems to have been invented purely for the sake of the tourists, and conveys no archæological connection with an old-established sanctity.

The photograph (Plate VIII, View c), which is taken from the south-eastern, or entrance, end shows the direction in which the *allée* is built, namely, towards a very marked dip in the high hills behind it, which I think is probably intentional. If so, the bearing of 313° 56′ seen along it, combined with the altitude of 17° 55′, produce a declination of 37° 41′ N., which was that of Capella in 780 B.C., or of Arcturus in 1180 B.C., either of which may be accounted, on other grounds, to be a probable date. This declination refers to no other bright star at any other date.

About two-thirds of the roofing stones of the *allée* are exposed, and are about a foot below the present surface of the ground; the remainder are still covered up. The height of the interior is of an average of 4 feet, and the width is about the same. The sides which support the slab roofing are formed, not of large stones on end, but of a sort of dry walling, of stones of various size, but none very large.

The photograph hardly shows what is an interesting feature, namely, the remains of a sort of semicircular walling, of the same nature as the interior, which faced the two sides of the entrance.

Enough of this still remains to prove its former existence, though a good deal of it has been removed; having proved to be too handy to the village, the "street" of which is only 50 yards away, to escape being built into outhouses, and so forth.

I mention this particularly as the semicircular entrance seems to be a marked feature of the Sardinian *allées couvertes,* or "Tombs of the Giants," recently described in *Memnon,* by Mr. Duncan Mackenzie.[1]

I do not know whether other "Eirde Houses" (for that is the Scotch name for these subterranean tombs or dwellings) have this characteristic, besides the specimen on St. Kilda, but I look forward to examining other specimens, with this point in view.

There is at St. Kilda the remains of a "broch," situated on a point guarding the bay in which is the village, and extremely difficult of access. I mention this "fort" or "dun" (as it is named in Gaelic) chiefly on account of its association with the *allée couverte,* "The Fairy House"; for a "broch" or "dun" seems to be of very much the same style of building as the nuraghe of Sardinia, which are

[1] *Memnon,* 1908, "The Tombs of the Giants, and the Nuraghe of Sardinia in their West European relations."

always found in the vicinity of the "Tombs ofthe Giants" (*see* Mr. Mackenzie's paper in *Memnon* before mentioned); and this double similarity between the Scotch and the Sardinian towers and burial-places (or dwellings), both in actual appearance and construction, as well as in the association of this particular form of tower with this particular form of burial, becomes the more striking.

In conclusion, I would again bring forward the importance of examining the prehistoric monuments of this, as well as other countries, for the evidence of orientation. No one with any knowledge of surveying and astronomy can deny that alignments to definite points of the horizon do exist in some of our prehistoric monuments, at least; if not in all. Speaking for myself, I have thus examined fifty-five separate megalithic objects in different parts of Ireland and Scotland, and in all this number there have only been six in which I could not find evidence of orientation. The ethnological importance of this is, of course, very great, arguing, as it does, the existence of a knowledge of the movements of the heavenly bodies, which implies an unexpected degree of culture among the inhabitants of these islands at an early date; as well as a connection, at all events intellectual, with the western inhabitants of the Continent, to press the results no further.

The external character of the megalithic remains in all countries is so similar that it would not be surprising to find that an equally similar internal character of "religious" import should be inherent in their construction; and though identity of religion does not, of course, necessarily imply identity of race, it at least points to a missionary impulse from a single source of origin, into which it would be of great interest to enquire. So elaborate a science as astrology, if it can be proved to exist, could scarcely spring up spontaneously among a barbarous people; and in our cloudy climate would be unlikely to rise at all; the heavenly bodies being so rarely capable of continuous observation: unless, indeed, the meteorological conditions of 4,000 years ago were extremely different from those of to-day. If it is the case that such a cult once existed in these climes, we must, I think, look to a sunnier, less humid country than our own; such as that East, whence the British religion of to-day has sprung, as the place of origin for that of prehistoric days in these islands.

It is to be remarked, further, that the orientation of these ancient buildings in Britain is to the rising of the sun on definite days of the year (associated with the rising of certain stars, and of the moon), and that these days are the festival days of the early Eastern Mediterranean nations: equinoctial, solstitial, "half quarter days" (when the sun rises at a point of the horizon exactly half-way between that of the solstices and equinoxes; namely, with a declination of 16° 30′ N. or S.). These dates (and consequently the direction in which the rising or setting of the heavenly bodies marking them), having become of religious observance, it would not be remarkable to find as we do find, that the tombs of the dead—perhaps we should say the Temples of the Dead—should be laid out also, in one or other of these "auspicious" bearings; and the cult of the dead thus be associated with the cult of the heavens.

"Half quarter days," mentioned above, which are known nowadays as Candlemas, May Day, Lammas, and All Hallows respectively, formed, as Sir Norman Lockyer has pointed out in "Stonehenge," the important dates of the "agricultural year"; and their employment, therefore, denotes the probability of the nation to be in a pastoral, or more or less settled, condition; so that, if the star dates to be derived from the monuments we have been discussing have any reality, (and I find it impossible to doubt it), this in itself reveals at how early a date the state of settled life was established in these islands.

A fairly high condition of mental culture is arguable also, as I think anybody who has had to do with the manipulation and moving of heavy weights will agree, from the very bringing together and erection of the enormous stones that were employed in the making of circles, alignments, and dolmens. And when to this had to be added the skilful choosing of the site, so that the required risings and settings of the sun, moon, or stars should take place behind a definite hill-summit, (though, as I have pointed out, it was often necessary artificially to mark the azimuths), then, I think, it must be allowed that our ancestors of prehistoric times, though, unfortunately, they had not the art of writing, have left behind them a record of ability, both of brain and body, for which they have not yet had proper credit.

(F)—THE GREAT CIRCLE, SEEN FROM S.W., WITH GREAT MENHIR; LATTER A LITTLE TO LEFT OF CENTRE OF VIEW. SEE PP. 32 AND 33.

(D)—LINE B. SEE P. 29.
(*Note.*—The menhir in foreground is one of those forming Great Circle.)

(C)—LINE "A. WEST." SEE P. 27.

(A)—GENERAL VIEW OF LINES "A. EAST" AND "A. WEST," TAKEN FROM N. SIDE OF GREAT CIRCLE. SEE P. 25.

(B)—LINE "A. EAST." SEE P. 27.

(E)—GENERAL VIEW OF GROUP FROM HEAP OF BOULDERS TO SOUTHWARD, SHOWING LINE C IN LINE WITH GREAT MENHIR IN CIRCLE (SEEN JUST TO LEFT OF TELEGRAPH POLE), WITH LINES B AND D TO LEFT AND RIGHT RESPECTIVELY. SEE P. 30.

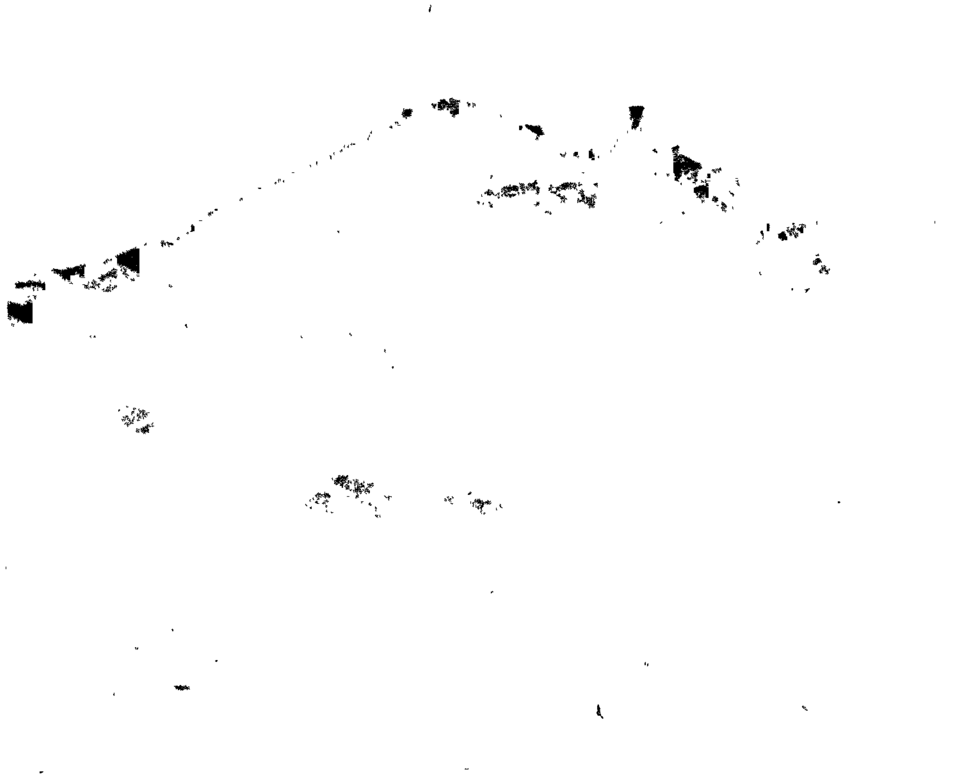
PREHISTORIC MONUMENTS IN THE OUTER HEBRIDES, AND THEIR ASTRONOMICAL SIGNIFICANCE.

(B)—ST. KILDA ISLAND. DOLMEN (1).

(A)—ST. KILDA ISLAND. DOLMEN (1).

(C)—ST. KILDA ISLAND. "THE FAIRY HOUSE."

PREHISTORIC MONUMENTS IN THE OUTER HEBRIDES, AND THEIR ASTRONOMICAL SIGNIFICANCE.



(A)—GENERAL VIEW OF DOLMEN (2), ST. KILDA, WITH "WINDOW" IN BACKGROUND TO WHICH IT IS DIRECTED. THE MAN SEEN IS STANDING WITH RIGHT HAND ON THE CAPSTONE.

(B)—NEARER VIEW OF "WINDOW" ("SLEAMHAIN DIOLLAITH") TO WHICH DOLMEN (2), ST. KILDA, IS DIRECTED.

PREHISTORIC MONUMENTS IN THE OUTER HEBRIDES, AND THEIR ASTRONOMICAL SIGNIFICANCE.

THE NATIVES OF THE EASTERN PORTION OF BORNEO AND OF JAVA.

(PRELIMINARY NOTE.)

By T. R. H. Garrett, M.A., F.R.G.S.

1. Introductory.

The observations detailed in the following notes were made during the author's residence in Borneo during the years 1909 and 1910 (with the exception of the measurements of the subjects Nos. 1 to 23 (original) which were made at their homes in Java). The majority of the subjects were the author's coolies, who, as regards the Sundanese and Javanese, were to a certain extent picked men, *i.e.*, though they were not picked as to stature or strength, yet had passed a rather perfunctory medical examination as to general health and soundness. The Banjerese were not picked even to this extent, though the author would not have engaged a man who was obviously unfit to work. Subjects Nos. 1 to 23 (original) were casually taken as they came in response for subjects to be measured. Those numbered 89 to 94 (original) were also casually met with in the jungle.

The results of the observations fall into two main divisions: (1) general notes on the outward appearance and mode of life of the individuals classified according to tribes; (2) a portion of the measurements made and indices with a few comments on the outcome of the comparison of these with other data.

The author hopes to publish with the remainder of the measurements more detailed general ethnological observations on the Banjerese and Orang Bulongan.

2. General Ethnological Observations.

(*a*) *Banjerese.*

This term is used in Borneo to signify the original inhabitants of the south-east portion of the island who have embraced Mohammedanism (non-Mohammedans are called by such terms as Orang Bukit and that very much misused term Dyak). The Banjerese have to a certain extent intermarried with the natives of Singapore, Java, and the rest of Borneo, especially the south and east coasts, and to a very small extent with settlers from China, British India, etc., though these latter as a rule keep to themselves. They almost all speak Malay, but they also have a language of their own which originally was distinct from Malay, but now consists of Malay words and distinct words in about equal proportions; and all the different

districts (Kendangan, Amuntay, etc.) have distinctive words, so that it is possible to tell a man's district from the words he uses.

About fifty per cent. of the males can write, and of these about one-half can write in Malay characters, about one quarter in both Malay and Roman characters, and the other quarter in Roman characters only.

Physically, they are not very strong and do not care for continual manual labour, and hence are not greatly employed as general coolies when other labour is available. But they make skilful artizans (such as carpenters, blacksmiths, etc.), and are especially clever at work in the jungle or on the river: for such work one Banjerese is worth two or three Sundanese or Javanese.

They are very intelligent, being readily taught clerical or observational work (such as in the laboratory or elementary surveying). Their sense of responsibility is as high as, if not higher than, that of any Eastern people I have come in contact with.

Neatness of dress is a marked characteristic, many spending much on clothing; in fact, many would be rightly described as dandies.

(*b*) *Orang Balik Papan.*

On the immediate coast of East Borneo, and in the larger villages near the mouths of the rivers, the original population has been displaced by the Banjerese, Bugis, Bajau (and further north Sulu), or so mixed with them as to be unrecognizable. But occasionally in more unfrequented places, and especially on the smaller rivers about the limit of tidal influence, may be found a few small communities which represent the original inhabitants of the coast. One such I came across in the Orang Balik Papan, who live half a mile from the mouth of the Sungei Penjangulin which flows into the head of the Balik Papan Bay. They assert that they are the original inhabitants of the district. In appearance they are sparely built, without any superfluous flesh, and they do not trouble much about washing. They circumcize, but not till immediately before marriage. Their language closely resembles that spoken in Pasir, the district to the south of Balik Papan, so much so that one of my men who could speak the Pasir language could understand a little when the Orang Balik Papan were speaking amongst themselves. They do not understand Bugis or Bajau at all, and but very little Malay, with few exceptions.

In 1910 the Kampong community consisted of about half a dozen houses, but formerly it was much larger. They are very closely intermarried, and do not seem to marry outside of their own people. They are very improvident, when they have rice (grown or bought with the proceeds of the sale of rotan and rubber) they hold a succession of feasts until it is finished, when they seem to use as their staple food a tripang found in the mud at low water. When I was there the daughter of the Patinggi (head of the village) had just been married. A great feast had been held and everything eaten up, with the result that the men had to go into the jungle to get rotan and rubber, with which to buy rice, without any food: even the children had had nothing to eat the day I met them.

They wear the short Bugis trousers in the jungle, but in his house the Patinggi was wearing only a small chawat (waist cloth). The women wear an ordinary Malay type of home-made Kain Sarong.

They are not Mohammedans, and the Patinggi declared that he did not think religion was worth considering (*tidah perduli*): they eat pigs but not monkeys. In appearance and habits they are similar to the other people of the immediate neighbourhood.

Sondro is diminutive, almost a dwarf, and certainly a partial idiot; he does but little work, not enough to support a wife (one had divorced him after a year for this reason), now he lives mainly on his brother.

(*c*) *Orang Tarakan.*

The Orang Tarakan are the natives of the small island of Tarakan near the mouth of the Batang Kayan (or Bulongan River). The total number of these probably does not exceed three hundred, and they are much mixed with Bugis, Bulongan, Sulu, and Banjerese. Their language is a distinct one, and the Bulongan people cannot understand it; it is not written. In appearance the Orang Tarakan resemble the Bugis and Bajau.

(*d*) *Orang Bulongan.*

These live near the mouth of the Batang Kayan. They are extremely mixed with the Bugis, Bajau, Banjerese, Sulu, and some little Kayan. They are probably not the original inhabitants of the district, but immigrants who have forced the Kayan, Punan, Menglihat, and similar tribes away from the mouth of the river.

(*e*) *Bugis.*

These are all immigrants into Borneo: many naturally so, but there is a tradition that an epidemic of smallpox almost depopulated the east coast about the middle of the last century, and that the Rajahs, especially the Sultan of Kutei, bought Bugis from the Rajahs in Celebes, especially of Sidendreng, to repopulate their territories. At the present time I have observed that frequently praus come over from Celebes with Bugis who then clear a piece of ground and build a house and remain on the Kutei coast for about a couple of years; then others come over and take their place or build a house near at hand, and the old ones return home. There is also constant communication now by steamer with the coast ports of Celebes.

(*f*) *Batavian Malay.*

The people living near Batavia who call themselves Malay, as distinct from Sundanese and Javanese, are of very mixed origin.

3. PHYSICAL ANTHROPOLOGY.

The measurements were made with Martin's anthropometer, etc., while age, colour of skin, and eye were recorded in the manner described (see *legenda* to

Table 1). The results are embodied in Tables 1 and 2, which show a portion of the observations made, and in regard to these the following comments are appropriate :—

Comparison of Measurements and Indices.

a. Averages.

Of the Banjerese I have been unable to find any previous measurements, except one by Hagen, but Deniker[1] and Hagen[2] give some figures for the Javanese and Sundanese. Hagen divides his subjects into three groups: (1) under 20 years of age; (2) 20 to 34, and (3) 34 to 60. The figures quoted below have been obtained by combining groups (2) and (3).

	Stature.	Head.		Cephalic Index.
		Length.	Breadth.	
Banjerese	1569·6	181·2	147·4	81·48
Boyanese (Hagen)	1616·1	178·7	149·6	82·5
„ (Deniker)	1587	—	—	—
Javanese	1570·6	177·6	150·8	85·0
„ (Hagen)	1606·4	177·7	151·0	84·6
„ (Deniker)	1616	—	—	84·6
Sundanese	1591·3	176·9	151·2	85·5
„ (Hagen)	1588·2	174·4	152·4	86·9
„ (Deniker)	1591	—	—	86·3

The greatest difference between the sets of measurements is in the stature of the Javanese.

b. Standard deviation and Coefficient of Variability.

The Egyptian series of Myers[3] and those of Sardinians, Cretans, and Corsicans, quoted by Duckworth,[4] are the only figures for the living subject that I have been able to employ in my comparisons.

[1] "The Races of Man," by J. Deniker, Sc.D.

[2] "Anthropologische Studien aus Insulinde," von Dr. B. Hagen, Natuurk., *Natuurk. Verh. der Koninkl. Akadamie*, Deel xxviii, Amsterdam, 1890.

[3] "Contributions to Egyptian Anthropometry," by Charles S. Myers, *Journal of the Anthropological Institute*, vol. xxxvi, 1906, pp. 237–271.

[4] "A study of the Craniology of the Modern Inhabitants of Sardinia," by W. L. H. Duckworth, *Zeitschrift für Morphologie und Anthropologie*, Band xii, Heft 3, ss. 439–504.

The remainder are taken from MacDonnell's[1] paper on the Human Skull.

	Head Length.		Head Breadth.		Vertical Radius.		Nasal Height.		Nasal Breadth.	
	σ	C.	σ	C.	σ	C.	σ	C.	σ	C.
Banjerese	6·22	3·44	6·77	4·59	4·76	3·59	3·19	7·18	2·68	6·89
Sundanese	5·28	3·93	5·24	3·47	6·62	4·97	2·39	5·30	2·45	6·27
Javanese	4·68	2·63	4·57	3·03	3·90	4·19	4·33	9·56	1·94	5·05
Moslems (Egypt) ...	6·09	3·13	4·34	3·01	4·65	2·83	—	—	—	—
Copts (Egypt)	6·13	3·17	5·09	3·56	4·15	2·83	3·41	7·14	2·72	7·57
English (Skulls) ...	6·27	3·31	5·28	3·75	4·28	3·73	2·60	5·08	2·16	8·89
Sardinians (Skulls) ...	6·43	3·48	5·32	4·03	3·99	3·53	3·75	7·50	2·12	8·89
Ainu[2] (Skulls)	—	3·20	—	2·76	—	3·67	2·16	8·89	—	—

Taking the coefficient of variation, the Banjerese, as to the head length, resemble the Egyptian, English, Sardinian, and Ainu; whereas the Sundanese show slightly less, and the Javanese distinctly less, variability than these. But for the head breadth the variability of the Banjerese is markedly greater than that of any of the others, whilst that of the Sundanese is about the same as that of the English and Egyptians, distinctly less than that of the Sardinians and distinctly greater than that of the Ainu, and that of the Javanese is about the same as that of the Egyptians and Ainu, but very much less than that of the English and Sardinians. As regards the vertical radius, the variability of all three Malayan races is distinctly higher than that of the Egyptians, but the Banjerese resemble the English, Sardinians, and Ainu, whilst the Javanese are slightly more variable than these, and the Sundanese very much more so. The nose measurements of the English, Sardinian, and Ainu, having been made on the skull, are hardly comparable. In nasal height the Sundanese show distinctly less, the Banjerese about the same, and the Javanese distinctly more variability than the Copts, whilst in the breadth of the nose all three Malayan peoples show less variability than the Copts.

[1] "Variation and Correlation of the Human Skull with Special Reference to English Crania," by W. R. MacDonnell, LL.D., *Biometrika*, vol. iii, pp. 191–244.

[2] Alice Lee, *Phil. Trans.*, vol. clxxxxvi, A, p. 230.

Turning now to the indices :—

	Cephalic.		Vertical.		Upper Facial.		Nasal.	
		C.		C.		C.		C.
Banjerese	4·46	5·47	2·81	3·84	2·92	6·26	7·81	8·88
Sundanese	3·18	3·72	3·22	4·27	2·65	5·76	7·76	8·93
Javanese...	3·45	4·06	3·46	4·59	3·70	7·98	9·18	10·72
Moslems (Egypt) ...	2·86	3·85	—	—	3·53	7·29	7·67	10·12
Copts (Egypt)	3·48	4·70	—	—	3·18	6·55	8·16	10·77
English (skulls) ...	3·26	4·38	3·22	4·61	—	—	4·58	9·64
Sardinians (skulls) ...	3·36	4·80	3·24	4·56	—	—	5·01	10·02
Ainu (skulls)	2·41	—	—	—	—	—	—	—
Sardinians (living), Livi	3·98	5·13	—	—	—	—	—	—
Cretans (living), Hawes	4·10	5·17	—	—	—	—	—	—
Corsicans (living) ...	2·90	3·82	—	—	—	—	—	—

The coefficient of variation for the breadth index of the Banjerese is very markedly higher than that of any of the others, except of the living Sardinians and Cretans, than whose it is only slightly higher; whilst that of the Sundanese is slightly lower than that of the others, except the living Sardinians and Cretans, than whose it is distinctly lower; whilst that of the Javanese is much about the same as that of the Egyptian Moslems, Corsicans, and English, but distinctly lower than that of the Sardinians and Cretans.

In the case of the vertical index I have only the English and Sardinian skulls with which to compare them, and here the Javanese show the same variability, the Sundanese slightly less, and the Banjerese distinctly less than these skulls.

As for the upper facial index the Javanese show more variability than the Egyptians, whilst the Banjerese and Sundanese show distinctly less. And in the nasal index the variability of the Javanese, whilst higher than that of the English and Sardinian skulls, is much about the same as that of the Egyptians, but that of Banjerese and Sundanese is distinctly less than that of the English, Sardinians, or Egyptians.

To sum up, with regard to their heads the Banjerese show distinctly less variability in the absolute measurements than do the Sardinian skulls, about the same as the Ainu skulls, slightly more than the Sundanese or the English skulls, and considerably more variability than the Egyptians and Javanese, whilst in the indices they show less variability than the Egyptians, Javanese, and the English skulls.

The Sundanese show less variability in the measurements than do the Sardinian skulls, about the same as the Egyptians, but less than the English and Ainu skulls, and considerably less than the Javanese, whilst in the indices the variability is much less than in any of the others.

The Javanese in the measurements show rather less variability than the Egyptians or the English skulls, about the same as the Sardinian skulls, and distinctly more than the Ainu skulls, whilst in the indices the variability is about the same as in the English and Sardinian skulls, and rather greater than that of the Egyptians.

Legenda to Table 1.

The only items which call for explanation are the following :—

Age.—Very few of the subjects could give their age exactly unless they had happened to be born about the time of some striking event, such as the Krakatau explosion. Hence, if the third molars were fully erupted I put the age at about 25, unless the appearance of the subject differed markedly from this age, or he himself was very certain that this was wrong.

Colour of Skin.—This is described according to Plate III in the British Association's *Notes and Queries on Anthropology,* 1899.

Colour of Eye.—This is described in accordance with the *Augenfarben Tafel* of Prof. Rud. Martin.

Legenda to Table 2.

In Table 2 the figures at the heads of the columns have the following significations :—

1. Stature.
2. Span of Arms.
3. „ „ Ratio of, to Stature 1,000.
4. Height sitting.
5. „ „ Stature 1,000.
6. Chest, Circumference, Deep Inspiration.
7. „ „ „ „ Stature 1,000.
8. „ „ Complete Expiration.
9. „ „ „ „ Stature 1,000.
10. „ Lateral Diameter, Deep Inspiration.
11. „ „ „ „ „ Stature 1,000.
12. „ „ „ Complete Expiration.
13. „ „ „ „ „ Stature 1,000.
14. „ Antero-Posterior Diameter, Deep Inspiration.
15. „ „ „ „ „ Stature 1,000.
16. „ „ „ Complete Expiration.
17. „ „ „ „ „ Stature 1,000.

BANJERESE.

TABLE 1. DESCRIPTIVE CHARACTERS.

NUMBER SER.	ORIG.	NAME	BIRTHPLACE OWN	BIRTHPLACE FATHER'S	BIRTHPLACE MOTHER'S	AGE	COLOUR SKIN	COLOUR EYES	HAIR COLOUR	HAIR CHARACTER	SHAPE OF FACE	PROGNATHISM	LIPS	REMARKS
1	24	KARIM	GUNTONG (AMUNTAY)	GUNTONG	GUNTONG	23c	BETWEEN 4 & 5	SLIGHTLY DARKER THAN 3	BLACK	STRAIGHT	WEDGE-SHAPE	VERY SLIGHT	UPPER, THIN LOWER, THICK	
2	26	SINOH	PADANG BESAL (AMUNTAY)	PADANG BESAL	PADANG BESAL	30c	SLIGHTLY DARKER THAN 5	DO.	DO.	CURLY	LONG	SLIGHT	THIN	FIRST COUSIN TO BOTH (3) & (4)
3	32	KHAMIS	TABALANG MATI (AMUNTAY)	TABALANG MATI	TABALANG MATI	20c	5	DO.	DO.	STRAIGHT	WEDGE-SHAPE	SLIGHT	THICK BUT SMALL	DO. (2) ONLY
4	35	KUTAY	KELUDAN (AMUNTAY)	KELUDAN	KELUDAN	27c	BETWEEN 4 & 5	3	DO.	CURLY	DO.	DO.	THIN	DO. (3) ONLY
5	33	JAMJAM	AMUNTAY	AMUNTAY	BETIN (AMUNTAY)	28c	DO.	BETWEEN 2 & 3	DO.	STRAIGHT	DO.	VERY SLIGHT	UPPER, MEDIUM LOWER, THICK	
6	34	DULLAH	PAGAT (AMUNTAY)	PAGAT	PAGAT	21	DO.	DO.	DO.	DO.	MEDIUM	SLIGHT	MEDIUM	
7	98	ACHMAD	AMUNTAY	AMUNTAY	AMUNTAY	28c	DO.	3	DO.	DO	LONG & NARROW	DO.	THIN	RATHER STUPID & WEAK
8	99	TAHIR	SUNGEI DURIAN (AMUNTAY)	SUNG. DURIAN	SUNG. DURIAN	21c	DO.	BETWEEN 2 & 3	DO.	DO.	MEDIUM	MEDIUM	THICK	
9	103	JANUM	AMUNTAY	AMUNTAY	HALABIU (AMUNTAY)	32c	DO.	BETWEEN 3 & 4	DO.	SLIGHTLY WAVY	DO.	DO.	MEDIUM	
10	30	KARIM	PANATTAN (TANJONG)	PAMATTAN	PAMATTAN	30c	DO	BETWEEN 2 & 3	DO.	STRAIGHT	WEDGE-SHAPE	DO.	DO	
11	111	TARIS	PAMARANGANG (TANJONG)	PAMARANGANG	PAMARANGANG	24c	BETWEEN 4 & 6	DO.	DO.	DO.	MEDIUM	VERY SLIGHT	THIN	
12	114	NAIM	MANGKOSSIP (TANJONG)	MANGKOSSIP	MANGKOSSIP	27c	BETWEEN 4 & 5	DO.	DO.	DO.	SHORT	DO.	DO	VERY NERVOUS
13	115	SULAK	HARUS (TANJONG)	HARUS	HARUS	21c	DO.	SLIGHTLY DARKER THAN 3	DO.	DO.	WEDGE-SHAPE	DO.	DO.	
14	117	UTIL	PAMARANGANG	PAMARANGANG	PAMARANGANG	27c	DO.	3	DO.	DO.	LONG & NARROW	MEDIUM	MEDIUM	SUFFERED FROM BERI-BERI 5 MONTHS PREVIOUSLY
15	27	USMAN	BERAIANG (BERABAY)	BERAIANG	BERAIANG	28c	SLIGHTLY DARKER THAN 5	SLIGHTLY DARKER THAN 3	DO.	VERY SLIGHTLY WAVY	BROAD & SQUARE	SLIGHT	THICK	
16	28	DUHASSAN	BERAIANG	LUNJOK (BERABAY)	BERAIANG	28c	4	SLIGHTLY LIGHTER THAN 2	DO.	STRAIGHT	MEDIUM	VERY SLIGHT	UPPER, THIN LOWER, THICK	
17	29	REMBANG	PARAN (BERABAY)	PARAN	PARAN	45	5	4	DO.	DO.	WEDGE-SHAPE	SLIGHT	DO.	ACCIDENT TO 2ND. FINGER R.H. SPAN ESTIMATED FROM DIFFERENCE OF FINGERS OF L.H.
18	38	HAJI MOHAMMAD TARSIN	PADAWANGAN (BERABAY)	SUNG. TABUK (BERABAY)	PAYAH (BERABAY)	45c	BETWEEN 6 & 9	BETWEEN 3 & 4	DO.	DO.	DO.	DO.	THIN	
19	69	ADUL	BUKAS (BERABAY)	BUKAS	BUKAS	27	BETWEEN 4 & 6	SLIGHTLY DARKER THAN 3	DO.	DO.	MEDIUM	MARKED	THICK	
20	85	AHONG	BERIKIN (BERABAY)	BERIKIN	BERIKIN	26	5	BETWEEN 2 & 3	DO.	DO.	DO.	VERY SLIGHT	THIN	
21	97	MATARANG	HAMAWANG (KENDANGAN)	BERABAY	HAMAWANG	35c	BETWEEN 5& 6	BETWEEN 3 & 4	DO.	DO.	WEDGE-SHAPE	MARKED	THICK	
22	102	DUKASIM	WAUWAY (BERABAY)	WAUWAY	WAUWAY	21c	BETWEEN 4 & 5	BETWEEN 2 & 3	DO.	DO.	DO.	ABSENT	THIN	
23	112	UDAU	BERABAY	BERABAY	BERABAY	26c	DO.	3	DO.	DO.	DO.	SLIGHT	DO.	
24	40	AKIP	RANTAU (KENDANGAN)	BERKUMPAY	BERKUMPAY	24c	DO.	SLIGHTLY DARKER THAN 3	DO.	SLIGHTLY WAVY	MEDIUM	VERY SLIGHT	MEDIUM	
25	95	ILOH	KENDANGAN	KENDANGAN	KENDANGAN	23c	DO.	4	DO.	STRAIGHT	DO.	DO.	DO.	
26	110	MANDUT	RANTAU	RANTAU	RANTAU	22c	DO.	3	DO	DO.	LONG & BROAD	ABSENT	THIN	
27	118	IPIK	PADANGBATONG (KENDANGAN)	PADANGBATONG	PADANGBATONG	27c	4	3	DO.	DO.	MEDIUM	SLIGHT	MEDIUM	
28	119	TARSIN	DO.	DO.	DO.	35c	BETWEEN 4 & 5	BETWEEN 2 & 3	DO.	DO.	WEDGE-SHAPE	MEDIUM	DO.	SUBJECT'S MOTHER IS 1ST COUSIN TO IPIK (27)
29	37	TAMIN	BANJERMASSIN	NEGARA	BANJERMASSIN	4[illegible]c	4	DO.	DO.	DO.	DO.	DO.	THICK	
30	86	MATALI	HAJI DEMANG (BERKUMPAY)	HAJI DEMANG	KAMPONG BAHRU (BUNTOK)	32c	6	SLIGHTLY DARKER THAN 3	DO.	DO.	BROAD	DO.	THIN	VERY STUPID
31	113	ASSIT	BANJERMASSIN	BERKUMPAY	BANJERMASSIN	27c	5	3	DO.	DO.	LONG & NARROW	DO	THICK	
32	101	CHOKIK	BANJERMASSIN	BANJERMASSIN	BANJERMASSIN	24c	BETWEEN 4 & 5	BETWEEN 2 & 3	DO.	DO.	MEDIUM	VERY SLIGHT	DO.	STAMMERS VERY BADLY
33	31	TAIP	PENGARON	PENGARON	PENGARON	22	DO	3	DO.	DO.	LONG & NARROW	MARKED	DO.	DIED 17/9/09
34	25	USMAN	MALINAU (BULONGAN)	BERABAY	BULONGAN	20c	BETWEEN 4 & 8	SLIGHTLY DARKER THAN 3	DO.	DO.	MEDIUM	SLIGHT	UPPER, THIN LOWER, THICK	A CROSS: FATHER BANJERESE; MOTHER BULONGAN
35	57	TAHIR	TANJONG PLAS (BULONGAN)	MARTAPURA	TANJONG PLAS	17c	BETWEEN 5 & 6	3	DO.	CURLY	WEDGE-SHAPE	DO.	THIN	DO. DO. DO. A DWARF.

BANJERESE.

TABLE 2 MEASUREMENTS.

SERIAL NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1518	1567	1032	820	540	820	540	794	523	283	186	269	177	222	146	189
2	1667	1801	1080	856	514	876	525	784	470	304	182	275	165	219	131	180
3	1552	1651	1063	835	539	810	522	771	496	279	180	258	166	205	132	183
4	1572	1631	1038	808	514	850	540	780	496	283	180	270	178	200	187	175
5	1594	1663	1043	655	535	842	528	800	502	273	171	257	161	203	187	190
6	1611	1737	1076	845	526	885	549	825	512	310	192	293	182	207	128	187
7	1520	1624	1068	790	520	822	541	755	497	272	179	260	171	194	128	172
8	1535	1638	1064	815	531	848	549	765	498	278	181	264	172	193	126	160
9	1510	1621	1075	801	530	872	578	809	586	279	185	263	174	200	132	166
10	1566	1655	1056	799	511	830	520	801	512	287	183	269	172	195	125	176
11	1576	1606	1020	863	548	856	543	764	485	300	190	282	179	190	121	178
12	1567	1620	1034	822	525	880	568	830	583	300	191	283	181	201	128	187
13	1560	1653	1053	850	548	881	568	818	522	287	183	271	175	203	130	193
14	1531	1592	1040	800	522	846	552	735	480	281	183	265	173	187	122	175
15	1636	1693	1037	865	541	880	538	846	517	305	187	290	177	217	133	200
16	1562	1653	1058	783	501	870	557	845	540	300	192	290	186	206	132	194
17	1547	1610	1041	817	528	890	530	770	409	275	178	253	164	196	127	182
18	1584	1684	1063	792	500	865	546	820	518	290	183	274	173	187	118	173
19	1623	1747	1038	895	531	884	585	828	491	281	167	264	157	214	127	207
20	1591	1663	1045	823	517	898	564	845	530	298	187	274	172	210	132	199
21	1623	1687	1040	857	528	862	530	800	495	291	179	278	171	202	124	176
22	1597	1727	1001	853	522	910	570	851	533	320	200	306	191	205	128	189
23	1490	1551	1041	835	560	827	555	792	532	274	184	262	176	205	138	195
24	1611	1723	1070	841	522	911	565	818	507	323	200	296	185	217	135	184
25	1544	1585	1027	800	518	825	535	765	496	294	190	282	183	198	128	185
26	1605	1755	1095	767	478	895	558	854	532	307	191	290	181	211	131	204
27	1467	1522	1039	775	529	828	565	759	518	264	180	249	170	188	128	178
28	1489	1650	1110	781	525	866	582	786	528	263	190	270	181	183	123	167
29	1505	1606	1057	847	527	820	511	771	480	282	176	260	162	204	127	183
30	1620	1704	1101	857	529	943	582	890	560	310	191	298	164	226	139	194
31	1576	1664	1056	847	537	857	544	765	485	292	165	273	173	203	129	190
32	1538	1599	1040	811	528	871	567	785	510	285	184	266	173	208	135	191
33	1544	1624	1051	789	511	905	566	865	560	297	192	270	175	222	144	208
MAXIMUM	1683	1801	1110	895	548	943	588	890	560	323	205	305	191	226	146	208
MINIMUM	1467	1522	1020	767	478	810	499	735	468	264	167	249	157	183	118	167
RANGE	216	279	90	128	70	133	89	155	92	59	38	56	34	43	28	41
MEAN	1569.64	1666.64	1055.58	823.94	525.06	862.09	549.42	802.24	511.18	290.45	184.91	273.39	174.24	203.67	129.73	186.24
	±5.71	±7.54	±2.57	±3.69	±1.76	±3.75	±2.23	±4.26	±2.50	±1.65	±0.82	±1.57	±0.88	±1.26	±0.89	±1.21
STANDARD DEVIATION	48.61	64.25	21.69	31.40	14.89	31.92	18.97	36.26	21.30	14.06	7.08	13.40	7.50	10.77	5.92	10.29
	±4.04	±5.33	±1.82	±2.61	±1.24	±2.65	±1.57	±3.01	±1.77	±1.17	±0.58	±1.12	±0.62	±0.89	±0.49	±0.85
COEFF. VARIABILITY	3.10	3.86	2.07	3.81	2.84	3.70	3.45	4.52	4.16	4.84	3.80	4.90	4.32	5.29	4.56	5.52
	±0.26	±0.32	±0.17	±0.32	±0.24	±0.31	±0.29	±0.30	±0.35	±0.40	±0.32	±0.41	±0.36	±0.44	±0.30	±0.46
34	1529	1584	997	840	550	831	544	786	515	281	184	269	176	199	130	190
35	1434	1567	1091	734	511	828	577	798	556	281	196	263	183	213	148	200

SERIAL NUMBER	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
1	124	189	146	130	92	93	63	136	41	36	35	77.3	68.7	46.7	85.4	49
2	108	191	143	139	94	95	66	134	46	40	37	74.8	72.8	48.5	80.4	58.5
3	118	161	139	125	94	96	61	131	43	38	36	76.8	69.1	46.6	83.7	49.5
4	111	181	144	132	94	96	57	133	38	33	37	79.6	72.9	42.8	97.4	50
5	119	188	139	135	94	108	56	136	40	36	40	73.4	71.8	41.2	100.0	51.5
6	116	175	154	131	97	106	62	136	46	42	38	86.0	74.9	44.9	82.6	56
7	113	187	146	134	97	102	66	136	46	44	39	77.5	71.6	46.1	86.6	46
8	117	172	147	122	90	105	62	133	42	37	38	85.5	70.9	46.6	90.5	47
9	134	171	140	129	86	96	67	133	47	47	39	83.0	76.4	50.4	83.0	46.5
10	112	177	143	128	103	112	72	134	47	44	39	80.8	78.3	53.7	83.0	47
11	113	183	147	136	96	104	63	136	44	36	40	80.3	74.3	46.3	90.9	50.5
12	110	180	142	128	85	82	56	127	36	34	36	78.9	71.1	44.1	100.0	50.5
13	123	176	142	130	95	101	65	136	44	40	32	89.7	75.9	47.8	72.7	51.5
14	114	169	142	136	90	97	62	132	44	39	35	84.0	77.9	47.0	79.6	42
15	122	166	154	134	104	111	66	147	46	41	42	83.2	72.4	44.0	91.3	66.5
16	124	176	145	140	90	95	56	136	45	39	40	82.4	79.5	42.6	86.9	47
17	118	177	139	126	87	88	63	136	43	36	37	79.5	71.2	45.6	86.1	44.5
18	109	189	143	129	96	101	63	133	50	42	40	75.7	68.3	47.4	80.0	50.5
19	123	194	152	142	96	103	70	140	49	48	41	78.4	73.2	50.0	83.7	60
20	125	189	153	130	94	97	68	139	43	39	37	81.0	68.8	44.6	86.1	53.5
21	108	188	161	136	98	104	68	141	46	42	38	88.6	74.7	46.2	82.6	55
22	118	178	163	138	97	95	56	138	39	35	41	87.4	78.9	40.6	105.1	67
23	131	179	160	128	90	100	56	133	40	36	41	83.8	71.5	48.1	102.5	43.5
24	114	176	154	139	98	101	64	144	44	39	44	87.5	79.0	44.5	100.0	59
25	120	161	170	135	95	100	61	132	46	40	36	93.9	74.6	46.2	78.3	51
26	127	187	144	132	90	97	65	135	44	41	39	77.0	70.6	46.1	86.7	54.5
27	117	177	144	132	96	100	62	131	45	40	43	81.4	74.6	47.3	95.6	43
28	112	178	145	126	97	108	63	137	45	41	40	82.4	71.6	46.0	88.9	50
29	114	190	153	140	108	113	71	142	44	40	42	80.6	73.7	50.0	95.5	51.5
30	120	181	154	136	95	102	66	148	48	42	41	85.1	75.1	44.6	85.4	61
31	121	189	147	132	95	99	69	133	44	41	37	77.8	69.9	51.9	84.1	60.5
32	124	180	140	131	95	105	65	136	50	46	38	77.8	72.8	48.1	76.0	50.5
33	135	176	150	130	98	119	68	137	49	43	44	85.2	73.9	49.6	89.8	56.5
MAXIMUM	135	194	170	140	104	119	72	148	50	48	44	93.9	79.5	53.7	105.1	66.5
MINIMUM	108	159	138	122	86	82	56	127	36	33	32	73.4	68.3	40.6	72.7	42
RANGE	27	35	32	18	18	37	16	21	14	15	12	20.5	11.2	13.1	32.4	24.5
MEAN	118.58	181.18	147.42	132.42	94.48	100.7	63.36	136.06	44.33	39.97	38.85	81.48	73.09	46.58	88.01	51.32
	±0.74	±0.73	±0.79	±0.56	±0.50	±0.83	±0.50	±0.52	±0.37	±0.41	±0.31	±0.52	±0.33	±0.34	±0.92	±0.62
STANDARD DEVIATION	6.21	6.22	6.77	4.76	4.24	7.09	4.27	4.46	3.19	3.50	2.6[illegible]	4.46	2.81	2.92	7.81	5.31
	±0.52	±0.52	±0.56	±0.40	±0.35	±0.59	±0.35	±0.37	±0.26	±0.29	±0.22	±0.37	±0.23	±0.24	±0.65	±0.44
COEFF. VARIABILITY	5.32	3.44	4.59	3.59	4.31	7.04	6.74	4.01	7.18	8.76	6.89	5.47	3.84	6.26	8.88	10.34
	±0.44	±0.29	±0.38	±0.30	±0.36	±0.58	±0.56	±0.33	±0.60	±0.73	±0.57	±0.45	±0.32	±0.52	±0.74	±0.86
34	124	173	150	127	85	91	61	131	47	41	37	86.7	73.4	46.6	78.7	46.5
35	139	175	145	130	94	103	61	176	42	39	36	82.9	74.3	48.5	83.3	44

SUNDANESE.

TABLE 1. DESCRIPTIVE CHARACTERS.

NUMBER SER.	NUMBER ORIG.	NAME	BIRTHPLACE OWN	BIRTHPLACE FATHER'S	BIRTHPLACE MOTHER'S	AGE	COLOUR SKIN	COLOUR EYES	HAIR COLOUR	HAIR CHARACTER	SHAPE OF FACE	PROGNATHISM	LIPS	REMARKS
36	72	USMAN	JASINGA (BUITENZORG)	BANTAN (SERANG)	JASINGA	25c	4	SLIGHTLY DARKER THAN 3	BLACK	SLIGHTLY WAVY	MEDIUM	MEDIUM	MEDIUM	
37	50	SARMAN	KADERONTOK (MENES)	KADERONTOK	KADERONTOK	21c	BETWEEN 4 & 5	BETWEEN 2 & 3	DO.	DO	WEDGE-SHAPE	SLIGHT	DO.	
38	96	SAJAR	CHURUBERANG (MENES)	CHURUBERANG	CHURUBERANG	25c	DO.	BETWEEN 3 & 4	DO.	CURLY	SLIGHTLY WEDGE-SHAPE	DO.	THICK	
39	46	ALIMARA	RANGKAS BITUNG	NANCHING (CHIMARGA)	RANGKAS BITUNG	21c	DO.	SLIGHTLY LIGHTER THAN 4	DO	STRAIGHT	DO	DO.	UPPER, THIN LOWER, THICK	
40	44	ARSITAN	PARUNG PANJANG	PARUNG PANJANG	PARUNG PANJANG	26c	SLIGHTLY DARKER THAN 4	BETWEEN 3 & 4	DO	DO	MEDIUM	DO	UPPER, THIN LOWER, MEDIUM	
41	51	AMAT	BENTENG (TANGERANG)	BENTENG	KRAMAT (TANGERANG)	21c	BETWEEN 4 & 5	SLIGHTLY DARKER THAN 3	DO.	DO.	WEDGE-SHAPE	DO.	THIN	
42	39	MEUNG	BUITENZORG	BUITENZORG	BUITENZORG	25c	BETWEEN 6 & 7	4	DO.	DO	DO.	MEDIUM	UPPER, THICK LOWER, THIN	
43	41	SIMAN	BATAVIA	BUITENZORG	BUITENZORG	21	BETWEEN 4 & 5	3	DO	VERY SLIGHTLY WAVY	DO	SLIGHT	MEDIUM	
44	73	AMAT	BUITENZORG	BUITENZORG	BUITENZORG	22c	DO.	3	DO.	STRAIGHT	DO.	MARKED	THICK	
45	108	ALI	BUITENZORG	BUITENZORG	BUITENZORG	24c	6	3	DO	DO	LONG	VERY SLIGHT	MEDIUM	
46	116	JIMAN	CHIBARUSSA (BUITENZORG)	CHIBARUSSA	CHIBARUSSA	30c	BETWEEN 4 & 5	3	DO.	SLIGHTLY WAVY	MEDIUM	MEDIUM	THICK	
47	74	MIDAN	BEKASI	BEKASI	BEKASI	30c	5	SLIGHTLY DARKER THAN 3	DO	WAVY	WEDGE-SHAPE	SLIGHT	MEDIUM	
48	21	MAS JAYAREJA	WANNAYASSA	KRAWANG	WANNAYASSA	38c	5	BETWEEN 3 & 4	DO	DO	DO	DO.	DO	
49	47	LIAN	RENGAS BANDUNG (KRAWANG)	RENGAS BANDUNG	RENGAS BANDUNG	21c	BETWEEN 3 & 4	3	DO	STRAIGHT	MEDIUM	MEDIUM	VERY THICK	
50	2	URESIN	PAGADUNGAN (CHIRIRIT)	PAGADUNGAN	PAGADUNGAN	25	BETWEEN 4 & 5	3	DO	DO	BROAD	SLIGHT	THIN	
51	3	ARMIAN	PURWAKERTA	MARACHANG (PURWAKERTA)	MARACHANG	16	DO	BETWEEN 3 & 4	DO.	DO	LONG & NARROW	DO.	UPPER, THIN LOWER, THICK	
52	5	JAMHARI	PURWAKERTA	PURWAKERTA	PURWAKERTA	30c	DO	SLIGHTLY DARKER THAN 3	DO.	DO	WEDGE-SHAPE	DO.	DO.	
53	55	AWA	RENGAS DENGKLOK (KRAWANG)	PURWAKERTA	SUKAPURA (SUMEDANG)	20C	DO	3	DO	DO	DO.	VERY SLIGHT	MEDIUM	
54	6	WARSUL	DEPOK (DRANGDAN)	CHITEKOK (PLERED)	DEPOK	30	DO.	BETWEEN 3 & 4	DO.	SLIGHTLY WAVY	DO.	DO.	THIN	
55	23	ASMIEN	TEGALJUNTI	TEGALJUNTI	TEGALJUNTI	21	5	DO.	DO.	DO.	DO	SLIGHT	UPPER, THIN LOWER, THICK	
56	10	ANGGA	WANNAYASSA	WANNAYASSA	WANNAYASSA	21	BETWEEN 4 & 5	4	DO.	DO.	DO.	DO.	THICK	
57	12	JUHRI	DO	DO.	BANDUNG	17	BETWEEN 4 & 5	3	DO.	WAVY	DO.	VERY SLIGHT	MEDIUM	
58	13	MAS SUMINTA KASOMA	DO.	DO.	WANNAYASSA	20	DO.	BETWEEN 3 & 4	DO.	STRAIGHT	DO.	ABSENT	DO.	
59	14	MAS SUBITA	DO.	DO.	DO	21	BETWEEN 9 & 10	11	FLAXEN	WAVY	DO.	DO.	THIN	"ORANG BULI"
60	15	MAS ABDUL	NANGGERANG (WANNAYASSA)	NANGGERANG	NANGGERANG	26	10	11	DO.	CURLY	BROAD	SLIGHT	UPPER, THICK LOWER, THIN	DO
61	16	MAS SURADIREJA	WANNAYASSA	WANNAYASSA	WANNAYASSA	24	BETWEEN 4 & 6	3	BLACK	STRAIGHT	VERY BROAD	ABSENT	MEDIUM	
62	17	MATSALI	DO	DO.	DO.	25	BETWEEN 4 & 5	3	DO.	WAVY	BROAD	SLIGHT	DO.	
63	18	SURA MANGGALA	DO	DO.	DO.	30	DO.	3	DO.	STRAIGHT	WEDGE-SHAPE	DO.	THICK	
64	19	ALI PRAYA	DO	DO.	DO.	27	5	BETWEEN 3 & 4	DO.	WAVY	DO.	DO.	MEDIUM	
65	20	SUTA	DO.	DO.	DO.	22	BETWEEN 4 & 5	BETWEEN 2 & 3	DO.	SLIGHTLY WAVY	LONG & NARROW	DO.	UPPER, THIN LOWER, THICK	
66	22	KARMAUI	CHISALAK	CHISALAK	CHISALAK	40c	DO.	3	DO.	WAVY	DO.	DO.	MEDIUM	
67	7	AWAN	DRANGDAN	CHIANJUR	DRANGDAN	41	DO.	BETWEEN 3 & 4	DO	STRAIGHT	WEDGE-SHAPE	MARKED	UPPER, THIN LOWER, THICK	
68	54	SOLDAN	KRAWANG	DO	PEKALONGAN	21c	BETWEEN 4 & 6	SLIGHTLY DARKER THAN 3	DO.	DO	DO.	MEDIUM	THICK	
69	4	JUMSAN	SUMEDANG (BANDUNG)	SUMEDANG	SUMEDANG	40	BETWEEN 4 & 5	3	DO.	DO	DO.	ABSENT	THIN	
70	9	KARTA	CHIKALONG (BANDUNG)	CHIKALONG	CHIKALONG	18	DO.	SLIGHTLY DARKER THAN 3	DO.	DO.	DO.	DO	DO	
71	49	ANTAWI	RANCHA (TASIK MALAYA)	RANCHA	RANCHA	38	BETWEEN 6 & 8	SLIGHTLY DARKER THAN 4	DO.	SLIGHTLY CURLY	DO.	SLIGHT	VERY THIN	
72	79	ARTASIK	CHITEPUS (BANDUNG)	CHITEPUS	CHITEPUS	26c	6	3	DO.	STRAIGHT	BROAD	DO.	THIN	
73	42	AMAT	TANAH TINGGI (BATAVIA)	BUITENZORG	BATAVIA	20c	BETWEEN 5 & 6	BETWEEN 2 & 3	DO.	DO.	MEDIUM	MEDIUM	DO.	A CROSS FATHER SUNDANESE, MOTHER MALAY
74	107	MAIL	CHICHINDAY (PURWAKERTA)	MELABIR (CHIANJUR)	CHICHINDAY	28c	BETWEEN 4 & 5	DO	DO.	DO.	BROAD	VERY SLIGHT.	DO	DO. DO. DO.

SUNDANESE.

TABLE 2. MEASUREMENTS.

SERIAL NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
36	1576	1863	1050	843	635	916	532	869	551	297	180	281	178	215	137	200	127	187	153	148	96	109	63	136	48	41	40	81.8	75.9	46.3	95.2	58
37	1624	1626	1001	842	516	871	536	702	488	289	178	271	167	214	132	191	118	180	147	141	89	96	64	130	45	41	38	81.7	78.3	46.0	84.5	56.8
38	1529	1573	1030	805	526	892	538	772	505	265	173	255	167	211	138	200	131	178	147	131	95	104	64	136	46	38	59	82.6	73.6	47.0	84.3	48.6
39	1510	1576	1044	799	579	888	566	850	563	313	208	293	194	203	135	100	126	171	144	127	60	99	67	134	48	45	35	84.2	74.5	50.0	72.9	49.5
40	1585	1637	1032	810	511	902	561	875	552	306	193	291	164	227	113	216	136	181	140	130	97	105	66	137	44	40	37	81.8	71.8	48.2	84.1	63
41	1581	1676	1060	825	582	835	578	705	495	[illegible]	189	283	179	205	150	161	120	170	143	130	92	98	64	130	45	40	38	84.1	76.5	46.4	84.5	51
42	1674	1772	1060	870	520	891	538	860	514	310	185	293	175	220	131	205	122	175	156	135	90	101	67	142	45	41	40	89.1	77.1	47.2	88.9	59
43	1662	1736	1050	792	479	882	534	862	521	279	169	263	159	216	131	201	129	178	150	135	100	108	73	141	49	47	39	84.3	75.8	51.8	79.6	55.5
44	1517	1545	1019	797	585	882	581	822	542	286	161	256	169	208	137	190	115	171	149	128	89	106	61	136	48	42	37	87.1	74.9	46.2	77.1	52
45	1661	1711	1030	866	501	680	529	826	497	292	176	279	168	206	123	101	115	176	151	136	95	109	65	137	46	42	37	85.8	77.3	47.4	80.5	58.5
46	1637	1684	1031	812	529	860	560	791	516	280	166	276	161	205	132	194	126	179	154	139	92	98	62	139	43	40	39	86.0	77.6	44.8	90.7	50.5
47	1580	1718	1088	825	522	980	620	910	576	322	204	302	191	221	140	210	133	177	150	132	92	107	62	142	44	36	43	84.7	74.5	43.7	97.7	62.5
48	1594	1692	1061	801	503	852	535	799	501	286	179	266	166	215	136	201	128	168	150	129	90	104	65	135	45	42	40	89.3	76.8	46.1	88.9	56.5
49	1595	1608	1008	853	535	888	557	850	533	309	194	279	169	215	135	205	129	176	156	140	90	100	60	142	42	33	42	89.7	80.0	42.3	100.0	58
50	1527	1636	1071	769	504	854	560	800	524	290	190	280	188	190	130	194	127	173	149	129	65	93	52	137	40	33	43	86.1	74.5	38.0	107.6	52.5
51	1578	1630	1033	834	528	786	498	738	466	293	186	274	174	199	126	183	116	173	141	118	83	95	61	130	47	43	38	81.5	68.2	46.9	80.8	48
52	1539	1590	1053	780	513	764	490	718	467	263	171	251	163	184	120	179	116	175	147	123	80	91	58	135	47	38	30	84.0	70.3	43.0	92.8	41
53	1618	1630	1008	818	506	907	561	863	534	290	179	279	172	221	137	205	127	181	160	135	100	103	68	142	50	41	42	88.4	74.5	47.9	84.0	60.5
54	1563	1644	1059	829	534	838	537	806	519	293	169	275	177	190	128	192	124	176	146	126	89	94	59	131	45	37	34	83.0	71.6	44.0	75.6	51.5
55	1460	1433	982	794	544	754	517	740	507	267	183	253	173	176	122	170	116	174	147	136	91	94	59	132	48	40	43	84.5	77.6	44.7	69.6	41.5
56	1565	1574	1006	820	524	768	491	746	478	276	178	273	174	187	119	183	117	174	146	131	87	99	61	130	45	38	38	83.3	75.3	46.9	84.5	48.5
57	1561	1615	1038	610	523	773	496	715	458	251	161	236	161	193	124	182	117	179	144	132	92	100	56	133	44	37	34	80.4	73.7	42.1	77.3	46
58	1686	1778	1055	860	505	641	500	791	470	286	170	277	164	201	119	182	108	177	161	160	91	96	67	145	45	38	42	91.0	84.7	46.2	93.3	60
59	1681	1677	1034	870	536	823	507	760	468	256	158	250	154	188	116	174	107	176	157	140	91	104	63	133	44	40	37	89.2	79.5	47.3	84.1	46
60	1589	1616	1030	820	523	890	567	845	539	280	178	262	167	233	149	221	141	184	147	136	90	103	56	133	41	36	42	79.9	73.3	43.6	102.4	67.5
61	1614	1646	1020	852	528	905	560	815	505	300	186	277	172	193	120	172	107	175	155	142	93	99	66	135	45	41	40	88.6	81.1	48.1	88.0	57
62	1732	1791	1034	867	501	905	592	845	488	323	186	307	177	217	185	205	118	165	166	144	96	109	69	145	47	41	38	84.3	77.8	47.6	80.9	55
63	1631	1701	1043	848	520	883	541	840	515	288	176	277	170	227	139	209	128	178	157	128	92	110	59	144	43	39	40	91.3	70.9	41.0	93.0	65
64	1651	1732	1050	861	522	880	533	839	508	303	184	291	176	213	129	198	119	189	165	145	98	107	63	136	44	40	38	87.3	75.6	46.3	86.4	61
65	1680	1673	1033	803	496	820	506	780	487	295	182	285	178	208	128	196	120	186	149	131	90	108	64	137	46	43	39	80.1	70.5	46.7	84.8	53.5
66	1633	1668	1033	819	502	808	495	788	470	282	173	272	167	207	127	178	109	189	166	135	99	103	68	138	49	43	43	82.0	71.4	49.3	87.8	52
67	1521	1645	1016	811	533	764	502	740	486	270	177	257	160	186	122	178	117	177	155	133	94	105	65	133	46	41	38	87.6	75.1	49.2	79.2	47
68	1598	1591	1000	856	538	912	578	859	540	295	185	276	175	221	139	208	131	174	150	129	92	104	66	137	46	43	43	86.2	74.1	48.2	93.5	63
69	1600	1695	1060	833	520	842	587	812	508	299	187	273	171	217	136	198	124	174	165	132	88	90	59	133	46	41	41	89.1	76.8	44.4	89.1	51
70	1615	1668	1031	825	511	826	511	800	495	267	165	263	163	224	130	209	189	176	153	132	93	100	60	138	47	40	37	87.4	75.4	43.5	78.8	53.5
71	1603	1657	1034	831	518	852	532	790	498	279	174	263	164	197	123	183	114	169	151	124	87	103	66	141	45	41	35	89.3	73.3	46.8	77.8	48
72	1570	1631	1086	835	529	935	594	875	555	305	194	287	188	212	138	196	126	175	152	135	93	104	62	136	40	33	38	87.9	78.0	46.0	95.0	53
MAXIMUM	1732	1791	1088	870	544	990	620	910	576	322	208	307	194	233	149	221	141	189	166	160	100	110	73	146	50	47	45	91.3	84.6	51.8	107.6	67.5
MINIMUM	1460	1433	980	769	480	754	490	715	458	251	158	236	151	178	116	170	107	168	141	118	80	90	52	130	40	33	34	79.9	66.2	38.0	72.8	41
RANGE	272	358	108	101	64	226	130	195	118	71	50	71	43	55	33	51	34	21	24	38	20	20	21	16	10	14	9	11.4	10.4	13.8	34.8	26.5
MEAN	1591.30	1647.16	1056.14	827.00	519.81	855.81	538.05	809.68	509.22	289.00	181.78	278.76	171.92	207.62	130.67	195.97	127.00	176.92	161.22	133.27	91.62	101.35	63.00	136.97	45.11	39.66	39.08	85.53	75.31	46.00	86.92	54.36
PROBABLE ERROR	±6.00	±7.89	±2.37	±2.78	±1.48	±5.84	±3.55	±5.32	±3.27	±1.86	±1.17	±1.66	±0.98	±1.46	±0.85	±1.38	±0.88	±0.59	±0.59	±0.73	±0.40	±0.57	±0.45	±0.44	±0.27	±0.34	±0.27	±0.35	±0.36	±0.29	±0.80	±0.66
STANDARD DEVIATION	64.07	71.18	21.37	25.11	13.33	52.59	32.01	47.97	29.90	16.80	10.51	15.00	8.84	13.19	7.70	[illegible]	7.95	5.28	5.24	6.62	4.31	5.18	4.02	3.94	2.39	3.05	2.45	3.18	3.22	2.65	7.76	6.55
PROBABLE ERROR	±4.24	±5.58	±1.68	±1.97	±1.05	±4.13	±2.51	±3.76	±2.13	±1.32	±0.82	±1.18	±0.69	±1.03	±0.60	±1.23	±0.62	±0.41	±0.42	±0.52	±0.34	±0.41	±0.32	±0.31	±0.19	±0.24	±0.19	±0.25	±0.25	±0.21	±0.61	±0.51
COEFF. VARIABILITY	3.40	4.32	2.06	3.04	2.57	6.15	5.95	5.92	5.80	5.81	5.78	5.48	5.14	6.35	5.90	[illegible]	6.52	2.98	3.47	4.97	4.70	5.10	6.38	2.88	5.30	7.66	6.27	3.72	4.27	5.76	8.93	12.05
PROBABLE ERROR	±0.27	±0.34	±0.20	±0.30	±0.21	±0.48	±0.38	±0.46	±0.44	±0.36	±0.45	±0.43	±0.40	±0.50	±0.46	±0.60	±0.51	±0.23	±0.27	±0.39	±0.37	±0.40	±0.50	±0.23	±0.42	±0.60	±0.49	±0.29	±0.33	±0.45	±0.70	±0.94
73	1614	1662	1024	867	537	875	542	824	511	292	181	276	171	215	133	199	173	186	159	140	108	100	73	141	50	45	41	85.5	75.2	51.6	82.0	60
74	1640	1760	1070	874	531	867	536	829	504	[illegible]	174	272	165	210	128	191	116	178	156	126	91	97	64	141	43	37	39	87.6	70.8	45.4	90.7	55

JAVANESE.

TABLE 1. DESCRIPTIVE CHARACTERS.

NUMBER SER.	NUMBER ORIG.	NAME	BIRTHPLACE OWN	BIRTHPLACE FATHER'S	BIRTHPLACE MOTHER'S	AGE	COLOUR SKIN	COLOUR EYES	HAIR COLOUR	HAIR CHARACTER	SHAPE OF FACE	PROGNATHISM	LIPS
75	77	MUSAH	CHIBELUT (BANTAN)	CHIBELUT	BANTAN	20c	BETWEEN 4 & 5	2	BLACK	STRAIGHT	MEDIUM	MEDIUM	THIN
76	6	RADEN SOBA WINATA	PURWAKERTA	PURWAKERTA	PURWAKERTA	55	DO.	3	GREY	DO.	WEDGE-SHAPE	ABSENT	DO.
77	48	DARSAD	LOSARI (CHERIBON)	LOSARI	LOSARI	32c	BETWEEN 3 & 4	3	BLACK	DO.	DO.	VERY SLIGHT	VERY THIN
78	109	SAJAT	PATAKAN (CHERIBON)	PATAKAN	PATAKAN	26c	BETWEEN 4 & 5	BETWEEN 2 & 3	DO.	DO.	BROAD	MEDIUM	THICK
79	1	MAUNA	CHIPAISAN (PURWAKARTA)	TEGAL	TEGAL	46c	DO.	DO.	DO.	DO.	MEDIUM	ABSENT	THIN
80	84	SINGOYOSO	BANJINGAN (BANJUWAS)	BANJINGAN	BANJINGAN	31	DO.	3	DO.	DO.	BROAD	MEDIUM	MEDIUM
81	88	MAS SONTOMARDONO	WONOSARI (KUTO-ARJO)	PAGEBANGAN (KARANG ANYER)	WONOSARI	24	BETWEEN 6 & 7	BETWEEN 2 & 3	DO.	DO.	MEDIUM	DO.	THIN
82	53	SLAMET	BONGAS (JOCJA)	BONGAS	BONGAS	19c	4	3	DO.	WAVY	WEDGE-SHAPE	DO.	DO.
83	70	MERTODIKORO	SLAYMAN (JOCJA)	SLAYMAN	SLAYMAN	25c	BETWEEN 3 & 4	BETWEEN 2 & 3	DO.	STRAIGHT	DO.	VERY SLIGHT	DO
84	60	SALEH	NABUMEN (SOLOKERTA)	NABUMEN	NABUMEN	40c	BETWEEN 4 & 5	4	DO.	DO.	DO.	SLIGHT	THICK
85	61	SURODIKROMO	KALI ORSO (SOLO TIGA)	KALI ORSO	BATAVIA	33c	DO.	3	DO.	DO.	DO.	DO.	MEDIUM
86	59	SARIP	GETAS (SAMARANG)	GETAS	GETAS	23c	BETWEEN 4 & 6	4	DO	DO.	DO.	MEDIUM	DO.
87	64	SARPAN	SAMARANG	SAMARANG	SAMARANG	25c	BETWEEN 4 & 5	2	DO.	SLIGHTLY WAVY	DO.	DO	UPPER, MEDIUM LOWER, THIN
88	43	KANDRI	SURABAYA	SURABAYA	SURABAYA	28	DO.	3	DO.	STRAIGHT	DO.	SLIGHT	MEDIUM
89	52	MAITO	BUMPI (LAMONGAN)	BUMPI	BUMPI	19c	5	3	DO.	SLIGHTLY CURLY	BROAD	VERY SLIGHT	THIN
90	68	SARIDIN	SUWALAN (SURABAYA)	SUWALAN	SUWALAN	25c	BETWEEN 4 & 6	BETWEEN 2 & 3	DO.	STRAIGHT	WEDGE-SHAPE	SLIGHT	THICK
91	71	LAUT	AT SEA	KAPUTRAN (SURABAYA)	KAPUTRAN	25c	DO.	DO.	DO	DO.	MEDIUM	MEDIUM	MEDIUM

JAVANESE

TABLE 2 MEASUREMENTS.

SERIAL NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
75	1618	1865	1042	844	523	914	566	640	570	305	189	296	183	228	141	206
76	1604	1579	1049	779	518	754	501	718	477	282	174	238	159	184	125	178
77	1585	1621	1022	825	520	890	561	645	545	323	204	306	195	208	131	198
78	1632	1756	1075	847	519	940	575	670	533	310	180	276	181	227	139	210
79	1580	1532	1009	811	534	802	527	785	516	278	183	[illegible]	171	197	130	184
80	1574	1701	1080	819	530	925	560	672	554	296	189	280	178	216	137	204
81	1528	1536	1005	798	522	770	504	665	575	264	168	245	160	192	128	182
82	1593	1653	1038	842	529	828	518	767	481	283	178	256	160	204	129	188
83	1538	1636	1062	830	526	874	556	642	549	280	182	268	174	200	130	188
84	1530	1582	1034	807	527	892	583	630	542	290	190	279	182	196	128	184
85	1637	1691	1033	882	530	938	578	588	543	314	192	285	174	222	135	211
86	1605	1648	1026	831	518	866	[illegible]	611	505	282	182	274	171	206	189	194
87	1585	1667	1045	810	511	920	550	875	562	305	182	290	181	206	129	196
88	1545	1647	1013	812	525	884	572	830	560	276	170	264	171	286	140	212
89	1619	1662	1031	860	585	900	564	654	529	316	196	299	179	218	135	221
90	1531	1622	1080	831	543	896	565	856	556	282	185	267	174	205	188	198
91	1567	1617	1039	834	546	715	570	859	562	293	168	276	159	219	143	190
MAXIMUM	1637	1756	1080	882	543	940	590	688	568	323	204	306	193	228	146	212
MINIMUM	1504	1532	1005	779	511	754	501	718	475	264	165	239	159	184	122	178
RANGE	133	224	75	103	32	186	89	170	93	59	39	66	34	44	24	36
MEAN	1570.59	1631.41	1032.4	825.35	525.47	878.59	557.82	829.36	528.18	291.82	186.71	274.53	174.71	209.24	133.18	196.65
PROBABLE ERROR	±8.71	±9.40	±3.40	±2.81	±1.35	±9.91	±4.64	±8.20	±4.46	±3.04	±1.40	±2.91	±1.44	±2.07	±1.01	±1.70
STANDARD DEVIATION	40.98	57.96	21.30	23.27	8.15	54.40	29.34	60.11	27.29	18.56	8.56	17.78	8.82	12.67	6.20	10.42
PROBABLE ERROR	±5.38	±7.63	±2.78	±3.06	±1.06	±7.07	±3.68	±6.80	±3.54	±2.41	±1.11	±2.31	±1.14	±1.66	±0.80	±1.36
COEFF. VARIABILITY	2.61	3.49	2.05	2.82	1.55	6.20	5.08	4.04	5.17	6.36	4.61	6.46	5.05	6.06	4.66	5.33
PROBABLE ERROR	0.34	±0.46	±0.27	±0.37	±0.20	±0.82	±0.66	±0.76	±0.67	±0.83	[illegible]	±0.84	±0.86	±0.79	0.60	±0.69

SERIAL NUMBER	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
75	157	181	148	139	93	104	63	130	43	39	42	80.7	75.8	46.6	97.7	67
76	117	177	148	125	91	94	63	130	55	51	37	81.9	70.7	46.3	67.3	38.5
77	125	171	146	136	90	96	64	133	46	42	36	84.5	79.0	44.1	80.0	64.8
78	129	179	156	135	95	109	69	147	40	34	41	87.2	75.5	40.1	102.3	68.5
79	121	183	148	127	94	90	59	123	48	41	41	79.6	68.5	46.1	86.4	40.5
80	130	181	161	138	97	109	69	144	49	44	39	89.0	75.8	47.9	79.6	58.5
81	119	177	152	130	98	108	70	135	46	44	38	85.9	73.5	51.6	68.6	40.5
82	119	183	158	138	94	100	65	138	42	38	37	83.5	75.6	47.1	86.1	83
83	125	180	151	134	95	108	58	130	36	31	38	83.9	74.5	39.8	100.0	60.5
84	120	178	157	142	94	101	73	139	52	43	38	91.5	68.5	51.8	73.1	68
85	129	173	151	140	93	99	65	143	46	41	40	87.3	80.0	46.5	88.9	60.5
86	121	188	146	133	93	106	59	144	42	34	37	81.3	73.1	41.0	80.2	64
87	124	178	149	139	94	104	65	136	42	36	37	83.7	72.1	46.1	80.2	84
88	137	183	146	133	98	107	66	134	46	41	35	79.8	79.7	46.6	76.1	66
89	124	176	147	128	85	95	58	142	44	38	40	85.5	72.7	41.1	90.9	60.5
90	123	177	153	129	96	100	62	145	48	40	38	86.5	72.9	48.7	84.6	51.0
91	128	156	153	131	83	98	64	138	47	40	39	82.4	78.0	47.4	68.0	67.0
MAXIMUM	137	183	161	142	98	109	73	147	56	51	42	91.5	80.0	51.8	102.3	67
MINIMUM	117	156	146	125	83	90	55	128	34	31	35	79.3	68.5	39.8	67.3	38.5
RANGE	20	27	16	17	15	19	17	19	19	20	7	12.2	11.5	12.0	35.0	28.5
MEAN	124.53	177.59	150.88	133.88	93.06	101.12	63.35	137.94	46.18	38.53	38.59	84.02	73.47	45.99	85.67	53.38
PROBABLE ERROR	±0.79	±0.77	±0.75	±0.80	±0.64	±0.66	±0.71	±0.86	±0.71	±0.77	±0.38	±0.40	±0.87	±0.60	±1.50	±1.17
STANDARD DEVIATION	4.83	4.08	4.57	4.86	3.90	5.26	4.34	5.37	4.35	4.70	1.94	5.45	5.06	5.70	9.15	7.18
PROBABLE ERROR	±0.63	±0.61	±0.59	±0.65	±0.51	±0.60	±0.56	±0.77	±0.56	±0.61	±0.25	±0.46	±0.66	±0.69	±1.10	±0.95
COEFF. VARIABILITY	3.84	2.63	3.03	3.63	4.19	5.20	6.85	3.82	9.34	11.80	5.08	4.06	4.59	7.98	10.78	13.42
PROBABLE ERROR	±0.50	±0.34	±0.39	±0.47	±0.54	±0.67	±0.69	±0.50	±1.36	±1.64	±0.68	±0.33	±0.60	±1.04	±1.30	±1.76

MISCELLANEOUS.

TABLE I. DESCRIPTIVE CHARACTERS.

NUMBER GEN.	ORIG.	NAME	BIRTHPLACE OWN	BIRTHPLACE FATHER'S	BIRTHPLACE MOTHER'S		COLOUR SKIN	COLOUR EYES	HAIR COLOUR	HAIR CHARACTER	SHAPE OF FACE	PROGNATHISM	LIPS	REMARKS
								ORANG BALIK PAPAN.						
92	89	KUNUT	SUNG. PENJANGULIN	SUNG. PENJANGULIN	SUNG. PENJANGULIN	35c	BETWEEN 4 & 5	BETWEEN 2 & 3	BLACK	STRAIGHT	WEDGE-SHAPE	MEDIUM	MEDIUM	SON OF (95), MARRIED TO SISTER OF (94).
93	90	PUNAY	DO.	DO.	DO.	40c	DO.	3	DO.	DO.	DO.	DO.	DO.	MARRIED TO DAUGHTER OF (95).
94	91	SINDRAY	DO.	DO.	DO.	38c	DO.	3	DO.	DO.	DO.	DO.	THIN	SUBJECT'S FATHER IS BROTHER OF FATHER OF (93).
95	92	SINDUN	DO	DO.	DO.	58c	DO.	BETWEEN 2 & 3	DO.	DO.	DO.	VERY SLIGHT	DO.	PATTINGGI (CHIEF) OF SUNGEI PENJANGULIN.
96	93	SONDRO	DO	DO.	DO.	26c	DO.	3	DO.	DO.	DO.	DO.	DO	BROTHER OF (94).
97	94	MAKAI	DO.	DO	DO.	20c	DO.	BETWEEN 2 & 3	DO.	DO.	DO.	DO.	DO.	SON OF (93).
								ORANG TARAKAN.						
98	76	SIAPIT	TARAKAN	TARAKAN	TARAKAN	28	5	4	BLACK	STRAIGHT	WEDGE-SHAPE	MEDIUM	THICK	
99	87	ULANG	SELIM BATU (BULONGAN)	LINGKAS (TARAKAN)	LINGKAS	20c	BETWEEN 4 & 5	BETWEEN 2 & 3	DO.	DO.	DO.	DO.	UPPER, THIN LOWER, THICK	
								ORANG BULONGAN.						
100	56	MOHAMMAD	TANJONG PLAS (BULONGAN)	BULONGAN	BULONGAN	16c	BETWEEN 4 & 5	SLIGHTLY DARKER THAN 3	BLACK	STRAIGHT	LONG & NARROW	SLIGHT	THIN	SAID HE WAS SMALL BECAUSE VERY ILL WHEN YOUNG.
101	80	ILIS	TANJONG PLAS	TANJONG PLAS	TANJONG PLAS	20	BETWEEN 4 & 6	2	DO.	DO.	BROAD	VERY SLIGHT	THICK	
102	82	UMAR	DO.	DO.	DO.	20	9	3	DO.	DO.	WEDGE-SHAPE	MEDIUM	MEDIUM	SKIN DISEASE FOR THE LAST 10 YEARS. SKIN PEELIN
103	65	LONGKA	BULONGAN	AMBON	BULONGAN	22	BETWEEN 4 & 6	BETWEEN 2 & 3	DO.	SLIGHTLY WAVY	DO.	SLIGHT	DO.	A CROSS. FATHER WITH PORTUGESE; MOTHER WITH SPANISH BLOOD.
104	66	ACHMAD	TANJONG SAYLOR (BULONGAN)	PONTIANAK	TANJONG SAYLOR	19	5	4	DO.	CURLY	DO.	MEDIUM	UPPER, THIN LOWER, THICK	NAME CHANGED TO SALEH BECAUSE OF ILLNESS, BUT STILL USE ACHMAD. A CROSS- PONTINAK-BULONGAN.
105	62	MOHAMMAD SAHUD	SENGKAWIT (BULONGAN)	PAMUTADDAN (SULU)	SENGKAWIT	25	BETWEEN 4 & 5	BETWEEN 3 & 4	DO.	STRAIGHT	DO.	SLIGHT	UPPER, MEDIUM LOWER, THICK	A CROSS- SULU-BULONGAN
								BUGIS.						
106	100	JANRIKO	MANGKASSAR	MANGKASSAR	BANTAITO (MANGKASSAR)	33c	BETWEEN 4 & 5	BETWEEN 2 & 3	BLACK	VERY SLIGHTLY WAVY	BROAD	VERY SLIGHT	THIN	
107	106	LOSIN	DO.	DO.	MANGKASSAR	30c	DO.	3	DO.	SLIGHTLY WAVY	MEDIUM	MEDIUM	MEDIUM	
108	58	SIBANGUN	TANJONG PLAS	DONGGALA	TANJONG PLAS	16c	5	4	DO.	STRAIGHT	BROAD	DO.	THICK	A CROSS, FATHER BUGIS, MOTHER BULONGAN. SUBJECT GRANDMOTHER SISTER OF GRANDMOTHERS OF (110) & (111)
109	63	UMAR	SENGKAWIT	PARE PARE	SENGKAWIT	88	BETWEEN 4 & 5	3	DO.	SLIGHTLY WAVY	WEDGE-SHAPE	VERY SLIGHT	THIN	A CROSS; FATHER BUGIS, MOTHER BULONGAN.
110	81	SANGKE	TANJONG PLAS	TIMPE (BONI)	TANJONG PLAS	21	DO.	BETWEEN 3 & 4	DO.	STRAIGHT	DO.	DO.	DO.	DO. DO. DO. SUBJECT GRANDMOTHER SISTER OF GRANDMOTHERS OF (108) & (111)
111	83	SINJAR	TANJONG PLAS	TIMPE	TANJONG PLAS	26	BETWEEN 4 & 6	DO.	DO.	DO.	DO.	MEDIUM	THICK	A CROSS; FATHER BUGIS, MOTHER BULONGAN. SUBJECT GRANDMOTHER SISTER OF GRANDMOTHERS OF (108) & (110)
								BATAVIAN MALAY.						
112	11	IDIE	PURWAKERTA	MESTER CORNELIS	MESTER CORNELIS	35c	BETWEEN 4 & 5	SLIGHTLY LIGHTER THAN 2	BLACK	STRAIGHT	MEDIUM	VERY SLIGHT	THICK	
113	78	JAINUN	PULAU GADUNG (MESTER CORNELIS)	PULAU GADUNG	PULAU GADUNG	22c	BETWEEN 4 & 6	3	DO.	DO.	WEDGE-SHAPE	MEDIUM	THIN	
114	104	ENTONG	MESTER CORNELIS	MESTER CORNELIS	MESTER CORNELIS	22c	5	3	DO.	DO.	MEDIUM	DO.	DO.	
115	67	SANIP	KEBUN KLAPA (WELTEVREDEN)	KEBUN KLAPA	KEBUN KLAPA	25c	BETWEEN 4 & 5	3	DO.	DO.	WEDGE-SHAPE	DO.	THICK	FOREARMS TWISTED AT THE ELBOWS.
116	105	ALI	PASAR SENEN (WELTEVREDEN)	KEMEIYORAN (WELTEVREDEN)	KG. KWETAN (BATAVIA)	24c	DO.	BETWEEN 2 & 3	DO.	DO.	MEDIUM	DO.	UPPER, THIN LOWER, THICK	
117	75	NASAN	BENTENG	BENTENG	BENTENG	21c	BETWEEN 4 & 6	SLIGHTLY LIGHTER THAN 2	DO.	DO.	WEDGE-SHAPE	SLIGHT	THIN	
118	45	SAYMAN	BEKASI	BEKASI	BEKASI	22c	5	3	DO.	DO.	MEDIUM	DO.	MEDIUM	
								SUMATRAN MALAY.						
119	36	ARUN	NAGA BERALI (EAST SUMATRA)	NAGA BERALI	NAGA BERALI	26c	SLIGHTLY LIGHTER THAN 4	BETWEEN 2 & 3	BLACK	STRAIGHT	LONG & NARROW	MARKED	THICK	

MISCELLANEOUS.

TABLE 8. MEASUREMENTS.

SERIAL NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
													ORANG BALIK PAPAN.			
92	1545	1677	1085	706	517	902	583	885	534	307	199	284	184	210	136	195
93	1601	1703	1064	854	533	924	576	791	494	314	196	294	183	190	119	176
94	1539	1667	1083	768	500	854	555	805	583	288	197	279	181	192	125	188
95	1584	1698	1071	797	503	905	571	819	517	288	188	272	172	214	135	201
96	1443	1620	1052	741	513	807	559	781	541	261	181	252	175	195	135	185
97	1501	1645	1096	744	495	835	556	789	565	282	188	266	177	186	124	179
MEAN	1535.50	1651.67	1078.00	783.67	510.17	871.17	566.67	801.67	522.33	290.00	188.17	274.50	178.67	197.83	129.00	186.83
													ORANG TARAKAN.			
98	1593	1696	1064	826	518	843	589	770	488	287	180	276	172	188	118	169
99	1541	1608	1041	778	501	777	603	737	478	286	186	266	172	196	127	167
													ORANG BULONGAN.			
100	1528	1600	1047	762	493	885	540	788	518	270	179	255	167	196	128	187
101	1589	1706	1074	850	535	863	556	822	518	308	190	283	178	205	129	190
102	1542	1702	1103	831	539	850	551	770	499	270	176	253	164	210	136	195
103	1621	1721	1061	846	524	886	546	804	495	276	170	270	166	215	133	199
104	1599	1685	1054	818	512	924	578	832	580	290	181	280	175	226	141	192
105	1587	1658	1044	857	527	881	565	810	510	270	170	251	158	217	137	196
MEAN	1577.67	1679.00	1063.83	828.33	521.68	874.83	556.83	804.33	520.00	279.67	178.17	265.33	168.00	228.00	134.00	193.17
													BUGIS.			
106	1601	1615	1008	864	540	925	577	817	510	306	192	297	185	213	128	202
107	1518	1600	1055	792	520	831	548	765	504	269	177	259	171	192	126	169
108	1505	1584	1052	783	520	902	600	858	570	297	197	270	179	206	136	197
109	1582	1748	1104	836	528	880	555	844	535	282	179	271	171	224	141	210
110	1578	1666	1056	835	589	876	556	800	507	283	179	266	169	208	128	192
111	1482	1577	1064	769	519	875	590	828	559	276	186	261	176	217	146	208
MEAN	1544.33	1631.67	1056.50	813.17	526.83	881.50	571.00	818.67	530.50	286.00	185.00	270.67	175.17	208.83	[illegible]	195.33
													BATAVIAN MALAY.			
112	1582	1540	973	836	524	820	518	780	493	273	172	245	155	185	117	174
113	1686	1707	1046	886	542	922	564	872	533	300	183	286	175	214	131	202
114	1687	1704	1010	894	530	900	533	850	504	309	183	296	175	209	124	200
115	1664	1691	1016	847	509	845	508	784	471	275	165	258	155	205	123	186
116	1634	1733	1061	837	512	912	558	839	507	324	190	312	191	217	133	208
117	1607	1691	1062	848	528	900	560	835	520	293	182	276	171	217	136	200
118	1631	1670	1022	836	513	892	546	849	520	296	183	282	173	214	131	198
MEAN	1634.43	1676.57	1025.29	855.71	523.14	884.43	541.00	829.43	506.86	296.00	180.86	279.00	170.71	208.71	127.71	194.43
													SUMATRAN MALAY.			
119	1547	1584	1025	815	526	890	575	845	546	286	185	268	173	211	136	189

SERIAL NUMBER	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	ORANG BALIK PAPAN.															
92	186	176	155	132	93	108	70	144	47	48	40	88.1	75.0	48.6	85.1	56
93	111	183	152	139	92	96	67	142	47	41	40	83.1	76.0	47.2	86.0	49
94	118	170	147	124	91	99	60	137	43	39	40	86.5	73.0	43.8	93.1	44
95	127	179	147	136	94	95	66	137	49	47	40	82.1	76.0	48.2	81.7	49
96	129	178	132	110	90	97	55	128	39	33	37	76.7	64.0	43.0	94.8	41
97	119	175	148	129	87	93	60	134	43	38	37	84.6	79.4	44.8	80.1	41
MEAN	121.67	176.83	146.83	130.00	91.17	98.00	63.00	137.00	44.67	40.00	39.00	85.52	73.90	45.93	87.53	45.67
	ORANG TARAKAN.															
98	106	182	144	133	94	99	64	140	45	39	39	79.1	73.1	45.7	86.7	50.5
99	121	180	153	124	96	104	65	140	47	42	40	85.0	66.9	46.4	85.1	
	ORANG BULONGAN.															
100	122	179	146	133	96	98	61	128	44	40	37	81.0	74.5	47.7	84.1	42
101	120	175	150	137	95	104	64	138	46	40	40	86.7	70.2	46.5	87.0	55.5
102	126	176	151	136	90	101	58	135	40	35	39	85.8	78.4	43.6	97.6	46.5
103	123	177	156	133	101	98	71	138	50	46	37	88.1	75.1	51.5	74.0	51.5
104	120	173	167	130	100	106	67	139	50	47	37	90.8	78.8	48.2	74.0	60
105	123	171	145	137	89	100	62	135	48	40	39	83.6	74.3	46.6	90.7	50.5
MEAN	122.33	174.83	150.50	133.00	95.17	101.17	63.81	134.82	45.50	41.33	38.17	86.10	75.80	47.38	84.55	51.00
	BUGIS.															
106	186	180	159	131	104	109	70	148	52	48	39	88.8	72.8	47.3	75.0	59.5
107	111	188	156	145	99	100	58	133	40	36	39	83.0	77.1	43.6	97.5	46
108	131	192	148	126	95	104	59	137	39	34	37	77.1	65.6	43.0	94.8	51
109	133	171	147	124	95	103	71	136	45	48	39	86.0	78.5	52.2	86.7	55.5
110	122	182	153	129	96	104	64	138	45	38	36	84.1	70.9	46.3	80.0	51.6
111	136	179	146	134	94	99	61	155	43	35	39	81.6	74.8	45.2	90.8	46.5
MEAN	126.50	182.00	151.50	131.50	97.17	103.17	63.82	137.82	44.00	38.83	38.17	83.35	72.28	46.27	87.47	51.67
	BATAVIAN MALAY.															
112	110	176	156	128	85	94	64	136	46	45	41	88.6	72.7	47.0	89.1	49
113	123	165	157	139	98	110	69	146	49	43	42	84.9	75.1	47.3	85.7	64
114	119	172	151	130	88	102	67	138	46	40	38	87.9	76.6	48.5	82.6	64
115	111	173	144	135	90	103	73	132	47	44	37	83.2	78.0	55.3	78.8	51.5
116	124	189	157	140	99	108	62	140	48	39	39	83.1	74.1	44.3	92.9	60
117	124	176	152	136	92	100	63	140	39	35	38	85.4	76.4	45.0	97.5	60
118	121	179	153	132	93	102	60	133	44	41	34	85.5	73.8	45.1	77.3	61
MEAN	118.86	178.86	152.86	134.29	92.14	102.71	65.43	137.86	44.71	40.71	38.43	85.50	75.10	47.50	86.27	58.5
	SUMATRAN MALAY.															
119	122	182	152	132	105	116	69	139	48	38	41	83.5	72.5	49.6	95.4	55

18. Head, Length.
19. „ Breadth.
20. „ Radii, Vertical.
21. „ „ Upper Nasal.
22. „ „ Alveolar.
23. Face, Upper Length.
24. „ Maximum Inter-Zygomatic Breadth.
25. Nose, Height.
26. „ Length.
27. „ Breadth.
28. Indices, Cephalic.
29. „ Vertical.
30. „ Facial.
31. „ Nasal.
32. Weight in kilogrammes.

All of these measurements were made in accordance with the Report of the Anthropometric Committee of the British Association, published by the Royal Anthropological Institute.

THE ATHARAKA.

[WITH PLATE X.]

BY ARTHUR M. CHAMPION, A.D.C.

INTRODUCTION.

BEING entirely ignorant of the science of anthropology I feel quite incompetent to write anything in the nature of a study of this people, but, having spent altogether a month or more amongst them, I have determined to record my observations of a people at present so little known, in the hope that they may be of some little use to others. During the taking of the census I had unique opportunities for studying the domestic habits, and I think I may say everything that I record under this heading I have seen with my own eyes. I have tried to get all information corroborated, and have discarded a heap of stuff that has not been confirmed by at least two separate authorities.

A fair amount of information was obtained from Government Chiefs, but by far the major portion from elders with whom I happened to get into conversation.

ETHNOGRAPHICAL.

In external appearance the Atharaka neither resemble the Akamba nor the Akikuyu, though perhaps they are closer in this respect to the Akikuyu. The colour of the skin varies more than among the Akamba, I have seen Atharaka jet black, but on the other hand I have seen others quite coffee colour. A very noticeable feature is the marked degree in which the feet are turned inwards. The feet are, I should say, much larger than among the Akamba. Another prominent feature is the length of the arm; the position assumed by a woman when she has nothing in her hand is very suggestive of the ape. The body is bent forward from the hips, and the long arms hang down in front almost to the knee. In fact, the whole attitude gives the impression that a hurried retreat would be on all fours. The young men remind one not a little of the ancient Egyptian types. The shoulders are broad, and the whole body tapers down towards the feet. They are athletic looking compared with the Akamba Anake. The girls are usually well-built, sturdy, and healthy looking.

The language has more the intonation of Kikuyu than Kikamba, the *L* being usually replaced by the *R* as in Kikuyu, though I am informed that a Mumoni Mkamba can more readily make himself understood to an Atharaka than a Mkikuyu.[1]

[1] Mumoni is the name given to that part of Ukamba which borders on the Tharaka country, and the Akamba of that part cannot pronounce the L as it is pronounced by the Machakos and Kitui Akamba.

The race as a whole are very hot tempered and excitable, and an argument rapidly flares up into a brawl, and from a brawl into a fight. Even the old men and chiefs get very excited over the most trivial matters, and rage in the Baraza like angry children. It is with the greatest difficulty that any order can be kept, as they all want to talk at once. On these occasions they seem unable to remain seated, and it is only with the greatest patience that order can be restored.

As a race the Atharaka are exceedingly proud, and though some of them are beginning to show a willingness for work, they are very independent, and unless everything is arranged for their convenience and they are treated better than their fellow-workers, who are frequently Akikuyu, they will go off in a huff. Several cases have recently been brought by Atharaka claiming wages after they have broken their contract by running away before they had completed a month's work. Such people doubtless return to their country in a bad frame of mind and spin long yarns to their friends. As soon as they come to realize the conditions under which native labour is carried on they will, I think, prove themselves useful people, as they not only strike me as being harder workers that the Akamba, but also very skilful carpenters, etc. Their brain power, however, would seem to be of a very low order, and two Atharaka whom I have had as personal servants for nearly a year show little or no aptitude for picking up any Kiswahili.

They are avaricious to a degree, and will accept presents freely and ask for more, but will give nothing in return; exorbitant bribes will not induce them to bring milk or eggs. Their ideas of trade are very one-sided, and the prices they demand for goats, wax, hides, etc., are ludicrous; the trouble at present is that they are not in want of rupees, so that they can afford to stand by their price or return with their produce. The attempt made to introduce trade, using the rupee as a medium, was in consequence a complete failure; a most lively trade could, however, be carried on in beads and wires with great advantage to the traders. At present the Akamba are exchanging their cast-off beads and ornaments for the Tharaka produce, which the wily Akamba in turn sell to the traders.

It had generally been supposed that the Atharaka were a poor people, but after spending many days walking about among them I am convinced that this is not the case. Though the herds of cattle are not so large as those of the Akamba, nevertheless every man of any standing possesses from ten to a dozen head. Goats, honey barrels, and tobacco are possessed by everybody.

As a whole the race seem very free from disease, but I was struck by the number of old people who were blind. On Keua Hill I came across a settlement of natives who seemed to be suffering from syphilis, the children being covered with the most offensive sores. The whole community seem to be prostrated by the disease. I was informed that it was not syphilis, and that such visitations had occurred before, and that after working its way through the natives of the settlement it would die out and most of the sufferers would recover.

As to the origin of these people it is very difficult to say, but they all seem convinced that their forefathers came from the south-east, and that they occupied

the Kitui District before the Akamba crossed the Athi, but that they were gradually driven back by the Akamba till they sought refuge amongst the hills which they now occupy. Some say that the Galla were in the country when the Atharaka were driven back, whilst others say that they found the country uninhabited. The Atharaka had wars with the Akamba and the Akituu, and I am informed by Mzee Kamundi that his uncle who was a chief before him was not very long ago driven back from Cha Ngondo by the Akamba, and the Atharaka have never ventured to return. According to the same authority the Masai visited them a long time ago, but were driven out by the Atharaka, who used bows as well as spears, and great numbers of Masai were killed. It would be very interesting to compare the customs of these people with those of the Pokomo and other tribes inhabiting the lower reaches of the Tana River. Many customs are similar to those of the Akamba, but there are also many which are entirely different—method of building may be quoted as one of the most apparent. No doubt many Kikamba customs have been absorbed, but I am strongly of the opinion that the Atharaka are not an offshoot of the Akamba, but an entirely different race. From inquiries and observations in Tharaka I should say that the Atharaka have certainly occupied their present country for three generations, as none of the oldest men seem to have any recollection of having lived elsewhere, or of having heard definitely where their fathers lived.

THE COUNTRY.

The Atharaka inhabit the Valley of the Tana or Kilaluma River from the Mkong'go River northwards till the Tana River passes under the Ngoro Rock. As far as I know there are no Atharaka living further down the Tana than this point. The Atharaka of the Kitui District live between the Tana and a line drawn from Cha Ngondo through Siri Etumo to the Ngoro Rock. They comprise some five to six thousand souls.

A more or less continuous range of hills runs from Mumoni Hill northwards to Kamabuongo and Mutialu and continues to appear on the left bank of the Tana as far North as Kikingo. A few miles north of Mutialu the Tana has managed to push its way through the range of hills and has cut for itself a deep gorge. Thence the river runs northwards again to make that great bend which is such a peculiar feature on the map of East Africa. It is among these hills and their western slopes that the Atharaka live, there being no habitations on the actual banks of the Tana, though the people are dependent on the river for water during the dry season. The hills are not high, Kamabuongo being about 2,900, and Keua about 3,200 feet above sea level. The Tana at the Ngoro Rock stands at about 1,500 feet. The majority of the rivers only run for a few hours after heavy rains, and the water obtained by digging in the river bed is generally brackish.

This range of hills is a denuded anticline of archean, gneisses, and schists, which afford wild and rugged scenery, but hard marching. Garnets are very plentiful among the gneisses.

After heavy rains, a layer of fine, black, sparkling sand (magnetite) is found

spread over the top of the quartz sand in the river beds. In some rivers this sand is very plentiful, and is used by the Atharaka for making their weapons and tools. In consequence of the abundance of oxide of iron (hæmatite or decomposed magnetite) the soil is very red in comparison with that of other parts of the Kitui district.

The whole country is covered with bush, except where the Atharaka have made clearings for cultivation. Along the banks of the Tana from the village of Mundu wa Ngula to the Ngoro Rock the bush is especially dense and is inhabited by waterbuck, the only species of game left in Tharaka. There are hippopotami in the Tana and a great variety of fish, the best for eating being the moderate-sized white fish with red gills and fins. The multiplicity of native paths render it possible to move about the country with the greatest ease in spite of the bush.

METEOROLOGICAL.

The temperature rises very high at midday, I did not have a thermometer with me, but I should say that it would touch at least 105 degrees F. in the shade during the hot season. At midday the sun is very oppressive, owing to the stagnation in the atmosphere which sets in about this time of the day. In the early morning and late evening a considerable breeze gets up; in the evening from the Mumoni Hills, and this, though by no means a cool breeze, is a great relief after the heat of the day; in the morning gentle puffs of air seem to come from the Tana River. The cause of this is, I think, the comparatively cool air from the hills and higher ground rushing down the long slope from Mumoni to take the place of the hot air rising out of the Tana valley in the evening.

The rains fall twice yearly, in April-May and again in November-December. In 1910 the rains broke in Tharaka on October 27th, and the spring rains had already broken when I arrived on April 13th, 1911.

DOMESTIC LIFE AND HABITS.

A human being passes through the following grades:—

Males.

1. *Karna* (up to five years).
2. *Kaegi* (up to circumcision).
3. *Ntheka* or *Ngoromo* (warrior up to marriage).
4. *Ntheka Nguru* (up to circumcision of first-born).
5. *Kisungi* (having circumcized child).

In this stage, a man becomes a *Mundu Mukuru* and is graded by the year in which he was circumcized, viz., *Mbabu* and *Mkilamana.*

Females.

1. *Karna* (up to five years).
2. *Kali* (up to circumcision).
3. *Idika* (up to marriage).
4. *Mwiki* (married but not yet given birth to a child).
5. *Mukaa* or *Mubiki* (up to circumcision of first-born).
6. *Mwekuru* (having circumcized child).

A Tharaka village usually consists of a dwelling-hut for each wife, a hut for cooking food, a hut for storing grain, one or more huts for the accommodation of goats, and occasionally a small hut for the owner to sleep in by himself. The whole is surrounded by a high thorn hedge with a small arched doorway about three feet high which is closed at night by drawing in a bundle of thorn branches. The dwelling-huts vary in size, but as a rule are not more than seven feet in diameter, and from six to eight feet in height at the centre. The walls are composed of sticks placed closely together to form a circle. These sticks are about four feet in height and are bound together by two continuous rings of wattle, one about two feet six inches above the ground, and the other at the top of the sticks. The doorway, which is about two feet three inches wide, extends up to the level of the lower band of wattle and is closed at night by a hurdle (*irigi*). Above the doorway the wall is continued up to the roof, but the sticks are placed horizontally. Standing about one foot out from the wall is a circle of posts about a dozen in number to which the ends of the rafters are fixed, presumably to give stability to the roof. The roof is thatched with grass, which is extended downwards to make an eave all round and finished up neatly on the top (Fig. 1). Inside a few forked stakes are driven into the ground and other sticks fastened across them to form a bedstead. This is generally about three feet from the ground and covered by a sleeping mat (*ithithu*), made of grass and bound with M'buyu thread (from bark of Baobab tree). The roof is used very largely for the storing of household utensils, especially when the hut is also occupied by goats, which is not infrequently the case, especially when the hut is that of the second or third wife.

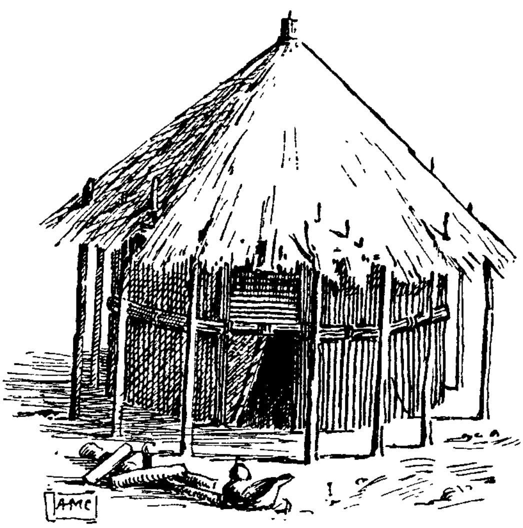


FIG. 1.

The huts used for kitchens and stores are built in a similar manner, but larger, and frequently better turned out. The doorway is not closed by a hurdle but with logs of wood (Fig. 2). In the kitchen one usually sees a fire burning

near the doorway and a litter of utensils on all sides—calabashes, nzelis, earthenware cooking pots, millstones, chiondos.

If there be no other hut for storing the threshed grain, a kinga or two will probably be put in the same hut resting on a little platform (*vide* Plate X). As a general rule, however, there is a special hut built to place the kingas in, and walls are sometimes omitted in the construction of these huts, their place being taken by a dozen or more strong uprights. Huts precisely similar to those for sleeping are built for the accommodation of goats, the doorway of these is closed in the same manner as that of the stores. Sometimes, but not often, one sees very small huts (*vide* Plate X) with a small bedstead inside. These huts have no proper walls, and are used by the owner of the village to sleep in. They can hardly be called huts, they are nothing more than grass shanties.

FIG. 2.

I am informed that these huts were usual a few years ago, but owing to the possibility of being taxed for them, the owners of villages are ceasing to build them. Small and very neat little huts are built on high stakes for the accommodation of chickens, but an old honey barrel seems to be more commonly employed. If there is an unmarried girl in the village whose mother is dead, she will live in a separate hut which is attached to the village, but generally surrounded by a separate fence. No unthreshed grain can be brought into the village, and for this reason large stores (Fig. 2) are built outside the fence. These huts are similar to the others, but the floor, which is constructed of wattle, is raised some eighteen inches off the ground; the top of the roof is about ten feet high, and the diameter of the hut about ten feet. When the store has been filled up with Mweli

cobs the door is closed by piling up logs held in place between the door posts and two outer posts.

The unmarried men, and those whose children are not yet circumcized, cannot sleep in the villages unless they are sick. In each settlement, therefore, the young men or *ngoromo* build for themselves one hut generally hidden in a thicket close to the settlement. These huts are perfect works of art. They are about 20 to 25 feet in diameter, and from 10 to 14 feet high, and built of very stout, well-fashioned poles. The doorway is about 3½ to 4 feet in height, and extends up to the level of the eave. The walls are composed of stout posts placed into the ground close together. One enters by a sort of wattle passage, which is, in reality, the closed-up ends of a continuous sort of wattle bedstead running completely round the whole hut; standing in the middle it gives one the impression of a circular saloon with berths all round. These huts are never occupied during the day, and I have never found any signs of habitation, except a fire.

The care with which these huts are built and the excellence of the workmanship struck me very favourably.

The uncircumcized boys also build similar huts. These, however, are smaller and generally much closer to the settlement. The occupants sleep on the ground, there being no bedstead or similar contrivance.

Method of Construction of Huts.

The dwelling and goat huts are built without a centre pole or supports. A circle is drawn on the ground where it is desired to erect the hut, and the sticks forming the wall are driven in and bound with wattle, as before described. The rafters are then bound on to the upper wattle band, and fastened at the apex until it is considered that sufficient rafters have been put in. Another wattle band then secures the rafters about midway between the eaves and the apex.

In the construction of the larger huts five upright posts are placed at regular intervals under this band of wattles to bear the weight of the roof. In some of the *ngoromo* huts I have seen a single centre pole used. The circle for the walls is always very well described, and I am told this is done entirely by eye, no mechanical contrivance of any sort being used.

Dress and Personal Adornment.

Clothes.—The only clothing originally worn by the men was a fringe of *mbuyu* threads (*ngigi*) covering the genitals and the anus. The older men would sometimes wear goatskins fastened over the shoulder; all the hair from the skins was removed, and grease and red mud rubbed in. Now, however, trade blankets are being worn, but are by no means universal, as with the Akamba. The Ngoromo all wear the *ngigi*, and some now wear calico saturated in grease and mud in the place of the goatskins. Boys up to the age of about six or seven

wear no clothing, but on reaching this age wear the *ngigi*, to which is frequently added a piece of goatskin in order to more effectively conceal the fact that they are not yet circumcized. Women always wear a short kind of leather kilt (*nguo*), and on marriage a leather apron (*kathari*) is added. This is fastened over the shoulders by a couple of strings, and extends from the breasts to the genitals, towards which it tapers off to a point. Uncircumcized girls wear beads round the loins, to which is attached a fringe of *mbuyu* threads, so as to cover the genitals. The threads generally have little bean-like things affixed to the end. I took these to be seeds, but was informed that they were carved out of wood. They frequently wear a tail of goatskin covering the posterior.

Ornaments.—The accompanying sketches show most of the ornaments in use amongst the Atharaka. As with the Akamba the older men do not wear many ornaments. The lobe of the ear is pierced and extended as with the Akikuyu. Round the extended lobe the old men frequently wear an hour-glass-shaped cylinder made of spirally wound brass wire. This is called a *ngotonggi* (Fig. 3). Fastened on to the rim of the ear are often seen one, two, or three little discs (*ndugira*) made of brass wire. Very little else is ever worn by the elder men except perhaps an armlet of brass or iron wire, or a ring of ivory round the upper arm. The young men show a considerable amount of ingenuity in the decoration of their bodies. At an early age the lobe of the ear is pierced, and great care is taken in the gradual operation of its extension. A circular peg of wood is put in, and this varies in size and shape according to the owner's taste. These pegs (*mituitu*) frequently resemble tops, having a sort of handle at the top by which they might be set spinning between the forefinger and thumb. Another ear ornament, but not so common as the *mituitu*, is the *marengo*; this is a half-moon-shaped piece of wood, which extends round the back of the neck from the lobe of one ear to that of the other. I am told that this is only worn by young men who have few personal charms to offer the girls. Thin needle-like spikes of wood (*ndorira*) about 2 inches or 3 inches long are frequently stuck through the rim of the ear. They give no explanation for this, and I think it is done to keep a hole clear for the insertion of the *ndugira* later on. The neck is usually adorned with a number of iron wire necklets, some being of smooth, round, trade wire, others much heavier in construction ornamented with little notches. These latter are, I think, made by the local smiths. Armlets and bracelets of iron and brass wire are very generally worn, but the brass ones seem a recent introduction. Between the calf and the

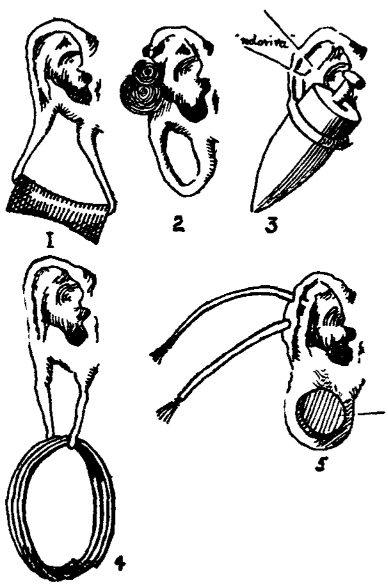


FIG. 3.
1. Ngotonggi. 2. Ndugira.
3. Mituitu. 4. Matulutia.
5. Ndiro and Ndingi.

knee a leather strap (*ikuli*) is frequently worn. It has two tails of leather hanging vertically from it, each about 5 inches or 6 inches long, running down the shin bone in front and down the centre of the calf behind; it is all cut out of one continuous piece of hide. I was repeatedly informed that this was an ornament, and worn for no other object. I cannot, however, help thinking that its origin, at least, must have been as a protection against thorns when walking in the bush. Anklets of black monkey skin are worn by the young men of position, but are not common. Anklets of brass, iron, or chainwork are worn by the majority. Before entering the dance the young men smear the legs with red mud and frequently

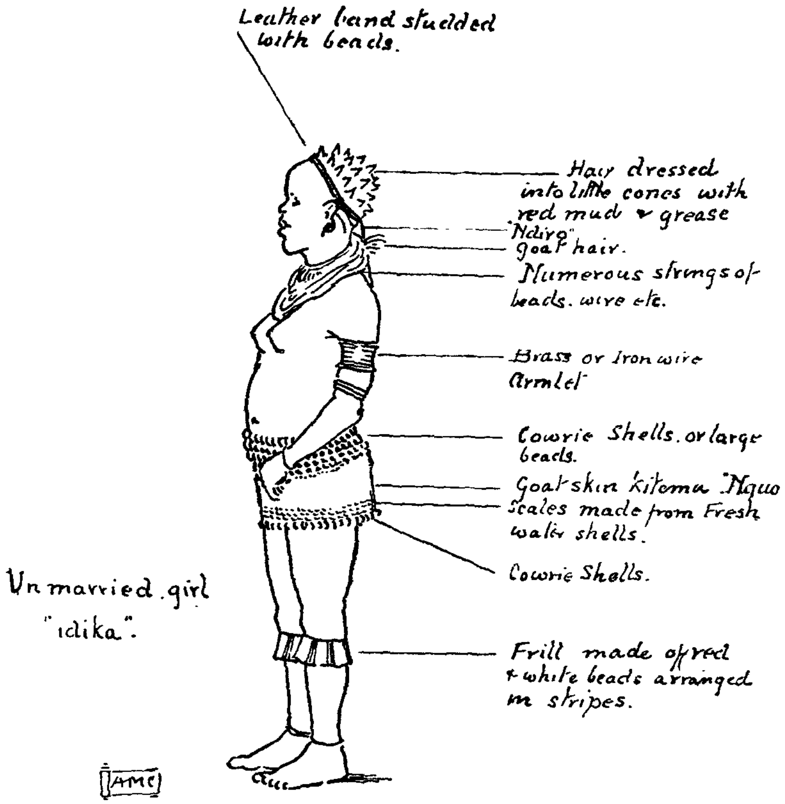


FIG. 4.

a great part of the body. Patterns are then picked out whilst the mud is still wet after the Masai fashion.

The women are literally weighed down with the weight of their beads and metal ornaments. The lobe of the ear is pierced, as with males, and extended. The *ngotong'gi* is not worn by women who wear the *matulutia* in its place (Fig. 3). This consists of about three or four coils of brass or iron wire about 3 inches in diameter. These are worn by all married women; in fact, I have never seen one without them. The neck is surrounded by a great mass of beads and wire. The beads are white and red trade beads. These were, I gather, worn by the Akamba some years

ago, and were disposed of by them to the Atharaka, when beads of other colours were introduced. The *kathari* also is studded and edged with similar beads and cowrie shells. Numerous strings of beads are worn round the waist : the *nguo* is heavily adorned with beads, cowrie shells, and rows of scales made of the shell of the fresh-water snail, which is very common in the bush. No *munyo* (chain tassel) is worn behind as with the Akamba. Just below the knee a band of beads is worn ; these are so arranged as to form a sort of frill, the beads being so strung as to form vertical stripes of white and red. The ankles are sometimes similarly adorned. Armlets and bracelets, similar to those of the young men, are also worn by the women.

The unmarried girls do not wear the *matulutia*, but insert a small round piece of wood in the lobe of the ear (*ndingi*). They also wear goat's hair brushes stuck through the rim of the ear. These are called *ndiro*, and seem to serve no further object than decoration. The weight of these causes the rim of the ear to droop over, which I am informed is much to be desired. I was also informed that the *ndiro* flap about when the girls are dancing, which greatly fascinates the young men.

The Hair.—With the old men the hair of the head is usually shaven, but some allow it to grow to its natural length. Among the young men the hair of the head is most carefully cultivated, and when it is tardy in growth it is augmented with *m'buyu* thread. Thin coils of hair, well plastered with red mud and grease, is the appointed style for the young bloods. I watched the operation of augmenting the hair on one occasion. A friend took two strands of hair well plastered with red mud and grease, and twisting each carefully spliced in a piece of *m'buyu* thread about five inches long, the whole was then rolled up tightly and pressed down to the side of the head. When this operation has been but recently performed it gives a curious effect, specially as the threads have a tendency to stand up at all angles, and it is not till they have been continually coated with grease and mud that they become indistinguishable from the hair. Sometimes one sees the hairs tied together in front and behind in a stubby pigtail after the Kikuyu fashion, but this is not common. The old women either shave the head completely or leave a tuft on the crown. The girls always leave a similar tuft, but tie it round with a thin leather strap in order to make it stand up (Fig. 4). The hair is thickly daubed with red mud and grease, either dressed so as to give a thatched appearance or dressed into a number of little cones, in which case the hair is quite invisible, owing to the thick coating of mud.

Beards are sometimes worn by the older men, but they are not the general rule.

Arms.

The Ngoromo, or warriors of the present day, carry spears of the Kikuyu fashion, but others have the leaf-shaped blade. These, I am told, are made by their own blacksmiths. Bows and arrows are also carried, but these strike me as being considerably smaller than those of the Akamba, but I have taken no measurements.

The arrows are carried in a cylindrical quiver made of hollowed-out wood, and decorated with ostrich feathers. The arrows are similar to those carried by the Akamba, and the same system of marking the head is employed. A round-shaped flat head is used for drawing the blood from cattle, and barbed wooden heads are used for shooting birds.

Shields (*longo*) are not often seen now, except in the hands of the retainers of the chiefs. I am informed that they are carried by everyone in war. These shields are made of ox-hide stretched on a wooden frame, the rim being bound with thin strips of leather. The central main rib is very massive, and a slit is cut in the middle at the point of balance to insert the hand. Very curious patterns are picked out in black, red, and white; I can get no information with regard to the meaning of these, or whether they are representations of anything. I am told that all the Ngoromo living in one hut have the same device on the shield, but I am unable to verify this by observation. The artistic work on the shields is done by the wives or belles of the warriors. Red ochre, kaolin, and ashes are the pigments used for red, white, and black respectively. I have asked several Atharaka if they could tell me what clan the owner of a certain shield belonged to, and they have invariably told me they could not. I have recorded the devices on two shields which have come into my possession. A small wooden shield (*ngao*) is used in the dances, and for the boys to practise with. These are about two feet six inches long and about six or seven inches broad; a rib runs down the centre of the outer surface, and a kind of boss is made in the middle. A slot is cut at the back, which serves as a handle. The contestants each crouch on one knee, holding the shield in the left hand and a stick in the right. They then attempt to strike each other with the stick very much after the style of singlestick, and ward off the blows with the shield.

The Tharaka sword (*luiyo*), which is worn on the right side attached to the belt, is similar in pattern to that of the Masai, and is from twenty-eight to thirty-two inches in length and carried in a red leather sheath. The blade is double-edged and broadens towards the end, and then finishes off in a sharp point. The handle is made of horn or wood covered with goatskin. A rungu (*njorma*) with a stone head enclosed in a leather covering is generally carried, also on the right side and tucked into the belt. The latter is made of ox-hide about three inches broad and frequently horizontally ribbed and ornamented with beads. An axe (*ithoka*), similar to that used by the Akamba, is also carried on the belt. These are extraordinarily well-balanced and handy (see Plate X). The shaft is about twenty-two inches in length. All these iron weapons are made by the native smiths.

I visited a smithy (*kianda*) situated on the west side of Mutialu Hill. It consisted of a round grass shanty, similar to the huts built for men to sleep in by themselves. A slight hollow dug in the ground and well lined with ashes constituted the forge. Two pillar-like stones (A) were set upright in the ground at one side about four inches apart. Between these and pointing downwards was

a fireclay pipe (B) about eight inches in length. Wedged up in juxtaposition by means of stones was a wooden branched pipe of similar calibre (D). Tied on to the end of each branch by means of string was a long goatskin bag (*miwa*) (C) about two feet or more in length. In the bottom of each bag was a slit (*c*) (*see* diagram) like a mouth, the lips being composed of two pieces of wood (*a*) held in the hand of the operator. Attached to the outer side of these two bits of wood was a leather thong (*b*), long enough on the one side for the insertion of all the fingers and on the other side for the thumb only. Thus the operator by opening the hand opened the lips, letting the air into the bag. Then, by closing the hand quickly and pressing the two pieces of wood forwards and downwards, he drove the air through the pipes into the forge; he worked his hands alternately, with the result that an excellent draught was produced and the cinders glowed brightly.

To extract the iron from the sand a layer of grass is placed on the cinders, and on

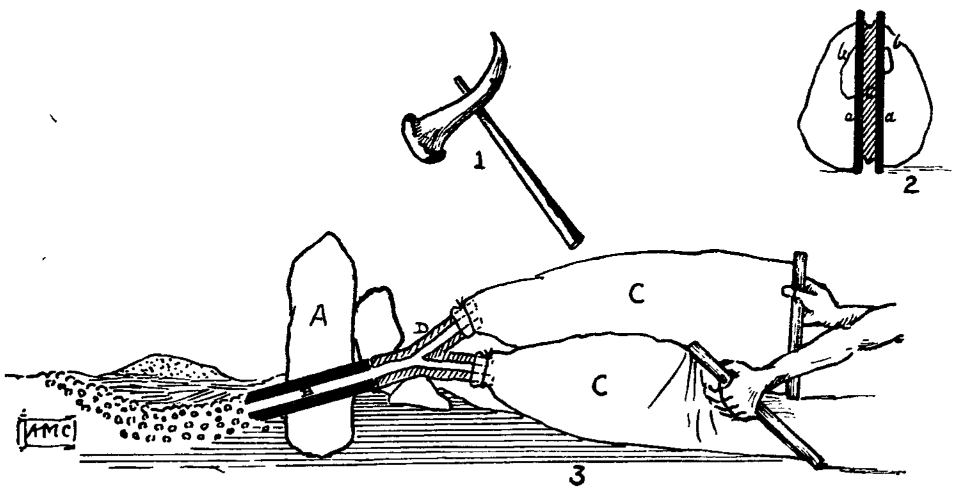


FIG. 5.
1. Hammer (*kiriba*). 2. End view of bellows. 3. General diagram of forge.

the top of that is placed the black magnetite sand; the bellows are then applied and the heat soon causes the metal to amalgamate. A long pair of pincers (*mgwadi*) of the same pattern employed in a village at home are used to hold the glowing metal, which is hit into shape with the hammer (*kiriba*), a hard piece of stone being used as an anvil. The hammer that I saw was very curiously shaped (*see* diagram) and fitted with a wooden handle. No other tools appear to be used.

The fireclay pipes are made from what I gather to be a mixture of mud and sand eroded from the deposits of murram, which are common all over the district. This mixture is modelled round a stick and put in the sun to dry. It is then baked hard in a fire.

I made some inquiries from the blacksmith as to where he got his knowledge from, and whether the Atharaka had always known the art or had acquired it from the Galla; but the only information that I could get was that his

father had known before him, and that it was from him that he had learnt the craft. The smiths are regarded as distinguished men amongst the Atharaka, and their portion of the meat is always the shoulder. They are permitted to marry as they please, and there are no restrictions imposed on them in this respect, as I gather is not infrequently the case amongst other African tribes. A smith may belong to any of the Tharaka clans.

FOOD.

The staple food of the Atharaka is muweli, but a good quantity of mbazi is also grown ; matama, kundi, ngenna (small beans in a long thin pod), and mobia (black beans) are also grown in lesser quantities. No maize is grown. The main shambas where the muweli and matama are grown are generally some distance from the village. Small huts are built for the storing of the grain, and the natives frequently sleep and reside there when there is a lot of work to be done in the shambas. There are extensive shambas on the east side of the main range of hills, and also along the Tana under Kisibi Hill.

The methods of cultivation are very primitive, but the shambas have a more tidy appearance than those of the Akamba. The soil appears to be very fertile. It is turned up with a *mau* stick, similar to that in use by the Akamba, and the sowing is done by making a hole with a long stick about 5 feet or more in length, and inserting three or four seeds.

The whole preparation of food, from the turning up of the soil to the boiling of the gruel, is entirely woman's work, but the men do much more work in the shambas than is the custom among the Akamba. A woman uses a *mau* stick without bending the knees, whilst a man always squats down with the shins doubled under the thighs.

The muweli cobs when ripe are picked off and placed in the food stores in the shambas, whilst the stalks are beaten down, and in this position are said to prevent weeds from growing up and choking the mbazi and matama, no doubt also giving shade to the roots and assisting the soil to retain moisture. When the harvesting is over, the cobs are threshed, either on a flat slab of gneiss, or on a piece of ground specially prepared with cow-dung. The grain is then stored in *kingas* in the villages. Sufficient grain is ground every day to supply the daily requirements of the village, as muweli flour very soon deteriorates, and will then cause severe attacks of diarrhœa. Grinding is also the work of women. This is done between two stones ; the lower one (*iiga*) is very large, and tilted forward so that the flour works its way downwards and falls into the *nzeli* placed underneath. The rubbing stone (*intheo*) is held in both hands, and the whole weight of the body thrown on to the arms. These stones are of gneiss or granite, and when they wear too smooth they are roughened by means of a piece of quartz. After being ground the flour is mixed with water and ground again and again till a fine pap results. This is called *usuu*, and is allowed to stand till it ferments slightly and is then drunk. Beer (*uki*) is sometimes made from muweli, the grain being first soaked in

water for three days and ground. It is then put into large earthenware jars (*ikura*) and fresh water added. This is then put to simmer over a fire for three days and allowed to stand for two or three days till a sufficient degree of fermentation is considered to have been attained. This, I am told, is a very powerful intoxicant. Mbazi is boiled whole frequently with its own leaves which are said to give it a particularly pleasant taste. Milk is drunk in large quantities and is used in the preparation of porridge.

Wild birds and fowls are not eaten except by uncircumcized children; eggs are not eaten by anyone. The reason that they give is that the circumcized people wish to make a distinction in the matter of diet between themselves and the uncircumcized. I suspect the existence of some other reason. Fish is not eaten by anyone; however, I am told that there is no prohibition, but that a man would be sick if he did so. Wild animals, cattle, sheep, and goats are all eaten by the Atharaka, but each person according to his sex, rank, relationship, and position in the village has his particular portion. The elder of the village eats the head, the heart, the front leg, and the spleen (*wengo* as in Kiswahili). The latter must not be boiled, but roasted, and eaten in company with other elders of the same standing as himself. The eldest wife in the village eats the hindquarters (*muliro*). The brother of the elder gets the other foreleg (*kwoko*), whilst his wife gets a hind leg (*kuuru*). The Ngoromo and male children get the chest (*lutu*), whilst the female children get the chops. A goat is cooked whole, and to each person is served out his portion; the recipient can eat with the others if he wishes, or go away and eat separately. With regard to the eating of other food-stuffs, I am informed that they can all eat together, but that each person has his own *nzeli*. Authorities for the above particulars are Mundu wa Mirigi and Mundu wa Kaibero (son of Mzee Mbaibui).

Honey is much cultivated by the Atharaka, barrels (*mwatu*) being placed in the Mbuyu (Baobab) trees in the bush (see plate). The barrels are similar to those used by the Akamba, the ownership being established by brands which generally take the form of an arrangement of dots and strokes. The barrels are not infrequently made of the wood of the Mekoma Palm, which grows very plentifully along the banks of the Tana and of the rivers that run into it. This wood is very easy to work, and I am told possesses such a degree of pliability that if the barrel falls it is not broken. The barrels are hollowed out by means of a long chisel, the handle being about four feet in length. The bees are driven out by smoking, the operator removing one end of the barrel and placing inside a lighted bundle of twigs, which give off a great amount of smoke; he drives clouds of smoke into the barrel by blowing violently with his mouth and the bees evacuate. Honey is eaten, but is more frequently used for making beer; at present many tons of wax must be wasted every year.

DANCES.

There are several varieties of dances, but I will only attempt to describe those that I have seen.

(1) *Kisboso.*—In this dance the men all carry a board (*lukongoro*) made of the Mukonguu tree. This is attached to the right wrist by a loop of string, so that the right hand is free to hold the stick (*keusia*) with which the board is beaten. The *keusia* consists of a bundle of *kianduli* twigs bound very tightly together; its impact with the board produces a deep sound like that of a muffled drum. The men partaking in this dance walk in single file, following the leader, who twists about describing circles round the person in whose honour the dance is being performed, at least such was done on all the occasions that I have witnessed this dance. The *lukongoro* are struck in slow time, and a low tremulous sort of chanting goes on all the time. No women take part in this dance.

(2) *Nzungo.*—The men form a circle and the girls stand in the middle. Then one man, apparently the leader of the dance, walks round beating a tomtom and singing in a shrill voice. When this song is finished the men rush inwards and with shouts and howls leap several times into the air and return to their places. The girls then each advance and choose their partners by touching them lightly on the hand. The singing is resumed by them all, and the chosen men advance towards their partners and clasp them lightly round the waist, whilst the girls place their hands on the men's shoulders, each facing each other. They both bend their knees in rhythm with the singing of the others, but they do not sing themselves. The men gently stroke the backs of the girls with the palms of their hands. The man with the tomtom then strikes up again and the dancers resume their places, and the performance is repeated.

(3) *Mungeri.*—This dance is very similar to the Nzungo, but the partners each place their hands on the other's shoulders, jigging up and down with their faces touching. This dance is done in double time and accompanied by rapid and riotous singing. It is sometimes performed by the men alone, in which case they stand their shields up in front of them and rest their hands on the apex, or if they have no shield clasp their spears with both hands at the point of balance. I have seen old men participate in this dance.

(4) *Mboboi.*—This dance is reserved for the circumcision ceremonies and other great occasions. This, I think, I have only seen in a modified form, as it is extremely sensual in character, and I think they are disinclined to dance it fully in front of a European. As far as I have seen, the men and women do not mix in this dance but each have their separate dances. The men stand in a circle to the accompaniment of singing. Then one or more spring out from the circle and run round in circles keeping one leg always to the front. Then with a grunt and a shout wheel round suddenly and finish the performance with a sudden hollowing of the back apparently with the object of jerking up the *ngigi* and exposing the private parts. He then returns to his place and another carries on the same performance. The performers display the greatest agility.

The married women have a very similar dance, but instead of running round with one leg to the front they advance by short jumps, the knees being kept bent and close together and the hands placed on the hips. The performance is finished by a sudden hollowing of the back and contracting of the muscles of the abdomen with apparently the same object as that described above. I have seen unmarried girls also taking part in this dance. The words which they sing are very much what one would expect: they were interpreted to me thus: the married women sing " the Ngoromo come every day to the village in search of something. Now Matika we know what it is they come to look for, show us what it is!" From this, I presume, it is usual for married women and girls to dance this in conjunction.

I do not know whether there are different dances for different seasons of the year, but these are the dances that I have seen on both my visits to Tharaka.

MEDICINE.

On entering Tharaka I found across the path, which at this point passed through a shamba, two posts set up on either side of the path with a cross-piece making a sort of doorway. On the crosspiece was hung the leg of a goat, this I was informed was placed there by a medicine man (*mùao*) to prevent wild animals from destroying the shamba. Where the path left the shamba a similar contrivance had been erected. In a large number of the villages I visited there were similar constructions with the cross-piece placed through an earthenware pot of which the bottom had been knocked out. This, I was on every occasion informed, was to ward off illness among the cattle.

In another village I found two forked sticks planted in a sunken earthenware pot and placed in the fork of the sticks was a piece of hedgehog's skin, a lump of quartz, and a piece of cowdung. This, I was informed, had been placed there for a similar reason.

It appears that young men who have but recently been circumcised are very susceptible to evil influence. Hence the services of a medicine man are engaged to place medicine near the village to prevent the approach of anyone possessing an evil spirit. On two occasions I found this medicine to consist of a piece of calabash tied to a stick which was planted in the ground by the side of the path. The piece of calabash was pierced by a number of long thorns and presented very much the appearance of a pincushion.

SOCIAL LAWS AND CUSTOMS.

(1) *Birth.*—On the birth of a child the father must call together his relations and slaughter a goat. This ceremony takes place outside the village, for no one can enter the village for five days after the birth. Should the father himself be away at the time of the birth he cannot himself enter the village till the goat has been slaughtered. During this period of five days no property can leave the village.

(2) *First shaving of the head.*—A child's head must be first shaved when it has reached the age of six months. The operation is performed about 2 p.m., and in the evening a goat is killed and eaten by the relations, who then cut two thongs from the skin and fasten these round the shoulders of the child. Then they all wash their hands in the gruel (*usuu*) and bespatter the mother with it. On the same night the mother and the father must cohabit, and on the next day normal conditions prevail again in the village.

(3) *Circumcision.*—Both boys and girls are circumcized. The foreskin apparently is not cut off as with other tribes, but a large part is left to hang down from under the penis. I do not as yet know anything of the circumcision rites.

(4) *Marriage.*—A man must always choose a wife from another clan. The usual dowry paid is thirty goats; it may, however, be more or less, but it appears that thirty is the normal number. Besides these goats a *kilembi*[1] of honey, an axe, and an iron necklace are also paid. From five to ten of these goats are generally given as a marriage portion, by the father, to his daughter.

For a period of four days from the day on which a wife first enters her husband's village no one is allowed to enter that village or that from which she came. In several villages I noticed young women wearing long aprons similar to those worn by all married women but extending below the knee. I inquired on two occasions the meaning of this, and was informed each time that these were recently acquired wives, and that it was customary to wear these long aprons till they were worn out and only then were they allowed to don the married woman's *kathari*.

When a Ntheka or Ngoromo takes a wife he must pay a goat to a Ntheka Nguru who in turn pays a goat to a Kisungi. Thus they all move up a grade and no overcrowding results.

The Atharaka are polygamists, but very few own more than two or three wives at most.

(5) *Death.*—I do not as yet know what ideas the Atharaka entertain of death. The dead body is thrown into the bush; this is the work of the wife or son of the deceased. Very old and much respected men seem, however, to be honoured with some sort of burial, but women are never buried, whereas amongst the Akamba the first wife is always buried. A goat is killed and eaten by all the Akuru of the settlement, the burier's portion being the skin and one leg. The Akuru direct the burier on which side the body shall be laid. The body can then be thrown into the bush. The brother of the deceased must, however, have connection with the wife of deceased on the fifth night after the death. The performer is called *Thela Luku.* This custom also prevails amongst the Akamba, the man being known as *Kuana.* The normal life of the village can then be resumed. The hut of the deceased, if he was a married man, must be vacated and allowed to rot away. When a child dies the body is stripped of all clothing and ornaments, but these are placed in a little heap by the side of the body in the bush. The spear and shield of a Ngoromo are also placed alongside the body. No property is buried

[1] A wooden drum in which honey is kept after extraction from the hive or barrel.

with married men; it is inherited by their sons. I was informed that theft of these things was quite impossible, and that any man who did so would at once be suspected of having compassed the death of the owner and would be cast out by his people.

Civil and criminal law.—The penalties for breach of the law seem to be less constant than among the Akamba, and the greatest difficulty has been experienced by others as well as myself in codifying even the commoner offences and their penalties. The unit of payment is one goat. Cattle are never given in payment of a penalty or dowry. As with the Akamba so with the Atharaka, no crime is so serious that it cannot be atoned for by payment.

(1) *Murder.*—From forty to sixty goats, one honey barrel, one iron for marking same (choro), one axe and one sheep, which must be slaughtered, constitutes the usual payment. The offender must pay as many goats himself up to twenty as he is able from the stock in his own village, the balance being paid by his clan. The other articles he must pay himself. The honey barrel must be made of the wood of the Movinga tree, which I am informed only grows on the north side of the Tana.

If a man kills another of the same clan he has to pay only thirty goats, a *choro*, and a sheep. This, however, was disputed by the elders at Kiema's, who said the blood-money was the same, but ten of the goats had to be slaughtered on the spot and eaten by the whole clan. It is important in making all payments that all the goats are handed over the same day.

The compensation for a woman is the same, but the goats are reduced to thirty. This also was disputed by the elders at Kiema's, who said that fifty-four goats, one *kithembi* of honey, and an iron necklace was the correct payment.

No *mbanga* or manslaughter seems to be recognized. Should a man survive a rain after having been struck, *i.e.*, six months, he is considered to have got over his injuries, and no payment can be claimed when he dies. Others, however, assert that should he never recover his full faculties, and his subsequent death be deemed by the Akuru to be due to the original injury, the offender can be called upon to pay full blood-money. The body is never cut open after death as is common with the Akamba. On causing a man injury of any kind, a goat should be paid immediately by the offender. If this is done and the man dies of the blow, his spirit (?) will not bring evil or misfortune on the village of the man who caused the injury.

(2) *Loss of arm or leg.*—One goat should be paid on the spot, but no further payment if the arm or leg withers or is lost. Others said that they have known seven to sixteen goats paid for the loss of the leg. The elders at Kiema's denied this and stated that seven goats might be paid if the arm or leg were cut right off.

(3) *Loss of eye.*—Seven goats appears to be the usual payment. One old "mukuru" was very persistent in asserting that it was seventeen in old times, but he was not supported on this point by the others. However, the elders at Kiema's said that fourteen was the correct number. If the left eye is the disabled one the goats paid must be handed over to the people of the sufferer's mother; if the right, the goats must be kept by his father's people.

(4) *Loss of ear.*—No payment for tearing the lobe of the ear (this is curious, as the Atharaka extend the lobe, and amongst other African tribes who do so I understand that a heavy penalty is inflicted). I was afterwards told that should the ear be cut right off one goat might be paid.

(5) *Loss of testicles.*—Same as for murder; the goats are paid at once and divided amongst the clan, but the other articles are not paid till the sufferer dies. Others say that the offender must give him a wife for the use of his brother.

Free love is permitted amongst the unmarried men and girls, but on her marriage it is the duty of the girl to tell her husband the names of all those Ngoromo who have had connection with her, and they must each bring a goat to the husband's village. Should a man cause a girl to conceive he must pay fourteen goats to her father at once. It is then open to him to offer to take the girl in marriage, but these goats do not reckon as part of the dowry. If there is no marriage the child becomes the property of the girl's father. If the girl subsequently marries she does not take this child to her husband's village, unless he pays her father five extra goats. These goats it is customary for the father to give the girl.

(6) *Adultery.*—On this subject there was a great diversity of opinion; at Kimundi's and Kivuvi's I was informed that seven goats were paid and the offender had to take a public oath that he would in future leave the woman alone. Others said that the payment was one large male goat and two female goats. The elders at Kiema's confidently asserted that two goats (one male and one female) was the customary penalty, and that one must be slaughtered and one kept alive; should the woman at any time be taken ill the ear of this must be cut and the blood sprinkled on her breasts.

No further payment is imposed if the woman gives birth, but should she die in child-birth full blood-money could be claimed.

(7) *Theft.*—The possibility of theft seems to be so little considered that no definite provisions are made against the committal of this and similar offences. For honey-stealing, however, a penalty of seven goats is imposed for every offence; death is never inflicted no matter how many times a man offends. If women or uncircumcized youths steal anything they must return the article, together with two goats, one of which must be slaughtered and eaten by the Akuru.

THE CHIAMA.

To make a Mukuru ya Chiama a Kisungu must undergo a probationary period with the Akuru ya Chiama, and then if he is considered to be a man of wisdom he can become one of them by payment of two goats. He has then the right to sit on the Chiama. There are Ngoromo ya Chiama, who wait on the Akuru ya Chiama; whether these are undergoing probationary periods or whether their functions are purely those of servants of the court I do not yet know, I am told that a part of their work is to cut up and distribute the meat. Inside the Akuru ya Chiama are the Akuru ya Nthuli, whose special function is to arrive at decisions, and for this purpose they go apart just as the Nzama of the Akamba.

It appears that the Chiama are a very elastic body, not meeting at any particular place nor consisting of any specified members. For instance, a man A of one district has a dispute with a man B of another district, they cannot arrive at a satisfactory agreement between themselves, so A goes to B and says, "We will call a Chiama." Then A goes and collects the Akuru of his neighbourhood and B does the same. When they are ready they appoint a place of meeting convenient to both, and the Akuru ya Chiama collect there and hear the case and give judgment. The chief of the district is not necessarily called into the case at all. The same applies to clans as to districts, no outsiders from other districts or clans are required to sit, or need be informed of the proceedings.

There was no fixed Chiama, before which all cases must be brought. It was merely a settlement by the elders who were concerned or had knowledge of the case. According to circumstances the elders of one district might sit in Chiama with the elders of one district one day and with those of another the next. It was just a method of settling disputes which grew up amongst a people essentially democratic.

Chiefs, as we understand the term, were non-existent, but there was in every community a man whose influence was predominant, generally two, one, so to speak, a civil consul, and the other a military dictator. The latter have been most frequently accepted by the Government, as their names were the first presented. It is, after all, natural that these men should have been mentioned to the European, whom the Atharaka no doubt regarded as their common enemy. But a chief did not hold a Chiama at his village, though it would no doubt frequently be held there if his advice or evidence were required. Centralized systematic Chiamas, such as the Government have instituted amongst the Akamba, would be most unacceptable to the Atharaka. Should a quarrel arise between two men of the same clan with regard to the distribution of property, the matter, I was informed by Tuto and Kivuvi, would be settled in the following manner. The Akuru wa Chiama of the clan would each subscribe a goat, and the goats so collected would be exchanged for a bull. This would be done without the knowledge of the two parties, who would then be called to the Ithembo. The bull would then be slaughtered and eaten by all present and the matter would be explained to the parties, who would be required to take a most solemn oath on the bull that they would cease to quarrel over this matter, and that, if they did so, they must now expect to die. Any remaining goats would be then distributed amongst the parties according to the decision of the Akuru.

When a Mukuru wishes to speak in the Chiama, he does so by singling out one man from the rest to whom he addresses his remarks, as if the others were not present, the duty of the man so addressed is to repeat the last few words of every sentence. The sentences are usually short and impressive on these occasions. It would be quite contrary to custom to address a man directly if you wanted to speak to him or to accuse him, a third person must always be addressed.

The Clans.—My enquiries concerning the clans of the Atharaka have up to

date been very unsuccessful. I am at present quite at a loss to find any system. It would appear that a clan is generally named from its founder or original head: some have a totem (?) or forbidden thing, others have not. Each clan has its own cattle brand. Below I have made out a table which may perhaps serve as a basis for future investigations.

Name of Clan.	Totem (?) or forbidden thing.	Prominent Member.	Remarks.
Utonga	*Nthia* (small gazelle)	Mundu wa Ngula ... Mundu wa Mirigi	Can eat the meat of the *nthia*, but the skin must not be brought into the village; disobedience brings illness, ulcers all over the body, resulting in death (Kikamba *mukkwa ?*).
Kandi	Ditto		
Mululu	Ditto		
Nyaga	*Nyaga* (ostrich) ...	Kimundi	Cannot kill the ostrich. The feathers can only be worn if bird is killed by man of another clan. If a man of this clan gets caught in the shadow of a certain hill called Kithari (north of Tana) he is seized with illness as above.
Mbula	Rain spirit	Mbaibui	Mbula is the name given to a man who long ago went out in search of the place the rain came from, and was taken up into the sky in a flash of lightning (sword of God). They recognize that it can destroy; they say God brings down the rain by beating his drum (thunder, *kueni*). Mbula never reached the right spot, but he came back and told people he had done so. My informant told me that the people were deceived by him. Whether this is merely his private view on the matter or not I do not know.
Nginna	*Nthia*...	Tuto Kivuvi... ... Menyi	*Nginna* is a small white bean growing in long green pods like *kundi*. This bean is eaten by the clan.

Name of Clan.	Totem (?) or forbidden thing.	Prominent Member.	Remarks.
Kamurigi ...	*Nthia*...	...	Cannot be smiths; because in the past so many were smiths, that one day they were all surprised by their enemies whilst at work in the forges, and the clan was nearly exterminated. After that they vowed that they would never return to the work which had been so disastrous.
Ndue	None	...	Ndue is name of original head of clan.
Kanzero	*Nthia*...	...	Kanzero is name of original head of clan.
Kamararo ...	Wild pig	...	Kamararo is name of original head of clan.
Mutwa	None	...	Mutwa is name of original head of clan.
Kamogwe ...	None	...	Kamogwe is name of original head of clan.
Kanthakami ...	None	...	Kanthakami (blood) is name of original head of clan.
Kathoga	None	...	Kathoga is name of original head of clan.

GENERAL.

If a woman runs away from the village of her husband, he cannot cohabit with his other wives till she returns. If he does so he must slaughter a goat before she can enter his village again.

It is the first duty of every woman on rising to fetch water; this is done in calabashes, several being carried at a time by means of two wattle frames carried on the back. The calabashes are placed between the two frames, there being large holes or sockets into which they fit. The frames are then strapped tightly together and the whole slung on the back, the weight being taken by the leather strap placed over the forehead. It is a serious breach of custom for a woman to leave her village without water in it.

The women are very industrious and neat with their hands: some make excellent baskets (see Plate X), and I am told that the Akamba freely exchange their beads for the Atharaka-made *chiondos*.

The Matika cannot remain in the presence of the Akuru; she must go away when they approach. I have seen this take place many times whilst I was in the villages taking the census.

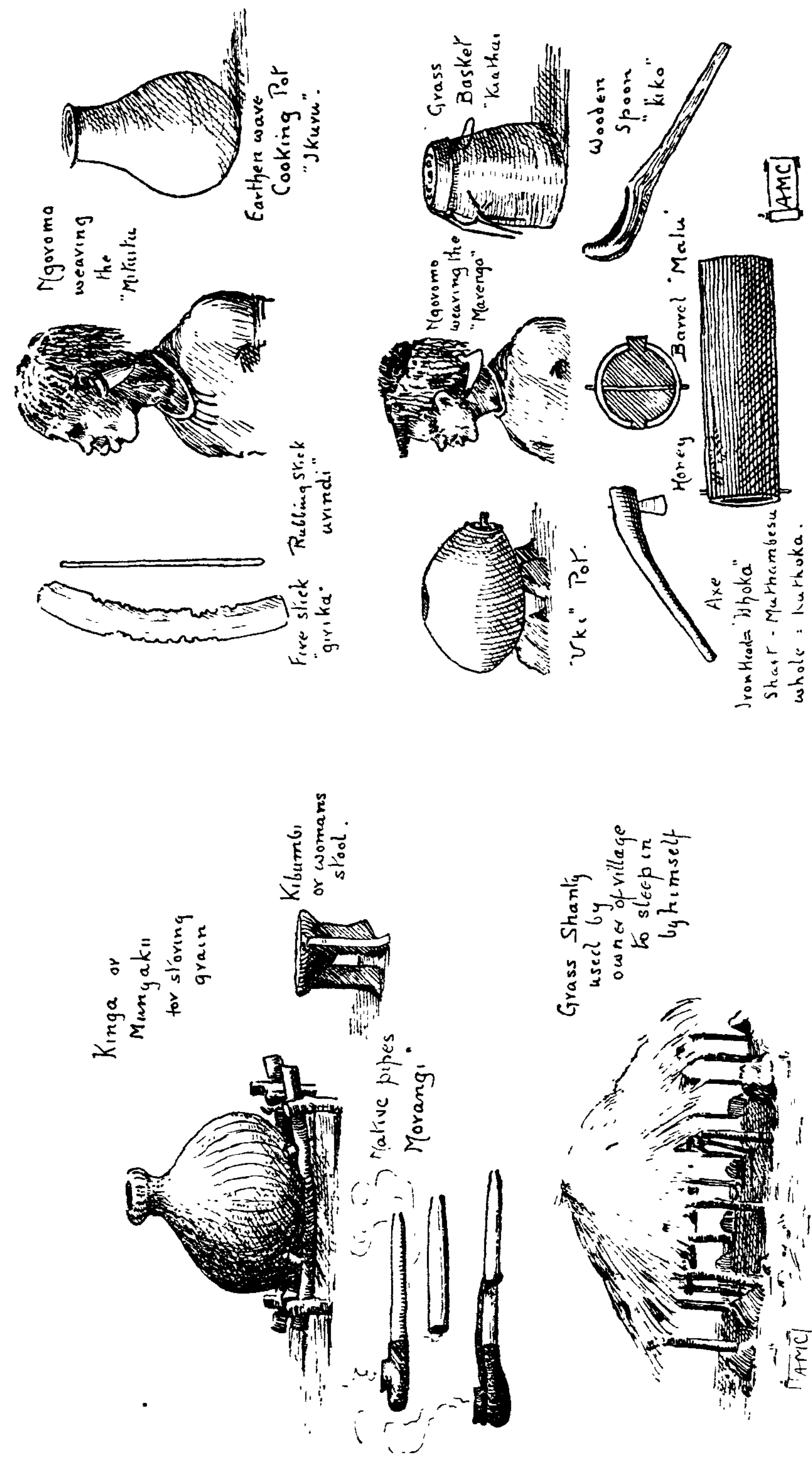
At the time of my visit there was little or no work to be done in the shambas, and I usually found the whole family perched on the top of a rock close to the village. They formed a most picturesque group, each member at work on something: the old women weaving *chiondos* or making string (they plait an excellent cord from the fibre of the *mugaar* tree), and the girls fashioning ornaments with leather and beads. The men at that time were very busy with the construction of their honey barrels.

Tobacco is universally grown, but only in small quantities; each man grows for his own requirements, but I am told that it is much sought after by the Akamba as its flavour is particularly good. Some of the old men smoke pipes (*morangi*), whilst others take snuff (see Plate X).

The horns of the bush-buck are much prized as they make very convenient snuff-boxes. The horns of the water-buck are made into musical instruments, one of which is nearly always to be found hung up in a village. These horns do not appear to be used in the dances and I do not know to what purpose they are put.

Fire is produced by rubbing two sticks together. The fire-stick (*girika*), made of the wood of the *muranguti* tree, is notched at the edge, and the rubbing-stick (*urindi*) is inserted, together with a little fine sand. The rubbing-stick is made of the wood of the *murindi* tree and is very hard (see Plate). This stick is twisted rapidly between the palms of the hands till smoke is given off and a little fine charcoal results. Then a little dry grass is put to this and gently blown till a flame is kindled.

The Atharaka are very expert in the manufacture of poisons, and apparently use this knowledge very frequently for the disposal of their enemies. It is therefore the custom for a man to partake of a morsel himself before offering food to another. The custom is universal, and no offence whatever would be taken should a man forget to do this, and in consequence his guest pointed out the omission. I have noticed that Akamba are very particular with regard to its observance when accepting food from the Atharaka.



THE ATHARAKA.

THE CLASSIFICATION OF THE PREHISTORIC REMAINS OF EASTERN ESSEX.

[WITH PLATES XI–XVIII.]

BY S. HAZZLEDINE WARREN, F.G.S.

INTRODUCTION.

THE prehistoric remains of East Essex were first brought to public notice by Dr. Henry Laver.[1] I have discovered that these belong to two distinct series, which are buried in different Recent deposits, the one overlying the other in stratigraphical succession. The two series of remains present certain differences, but both yield flint arrow-points of various types, together with implements of polished stone and primitive pottery. All these points will be discussed in detail in the sequel.

Having, thus, two series of different ages, I was particularly desirous of obtaining some trustworthy basis of comparison by which I could define either or both of these series as Early Neolithic, Late Neolithic, Early Bronze age, or whatever it might be.

Here I found myself confronted by very serious difficulties.

I hoped that the pottery might give the best chance of elucidating the problem. But primitive pottery, even of the same period, varies greatly; and further, in searching for comparative material in our large public collections it is not easy to find any which can be certainly defined as Neolithic. Even if the pottery from the Long Barrow of West Kennet[2] be itself Neolithic, its peculiar quality and ornamentation certainly cannot be taken as typical of, or confined to, that period. Pitt-Rivers, in the course of his excavations, found the same kind of pottery, with the same ornamentation, directly associated with Bronze age remains.[3] This point will be mentioned again when considering the pottery of the later series of prehistoric remains from this district.

On turning our attention to the flint implements, we find that they do not give us evidence that is any more definite. Unless we take the indefinite quality

[1] *Essex Naturalist*, vol. iii, p. 159.

[2] This pottery has been many times figured. It is now preserved in the Greenwell collection in the British Museum.

[3] Pitt-Rivers *Excavations in Cranborne Chase*, vol. iv, 1898, p. 100, and Pl. 261, fig. 17. It is here concluded that this type of pottery is exclusively of the Bronze age. Compare also Pl. 298, fig. 8, of the same volume.

of rudeness as a test of age, there are no post-Palæolithic types that can definitely be asserted to be earlier than the knowledge of metal. Not only barbed and leaf-shaped arrow-points and perforated stone axe-hammers, but flakes, scrapers, knives, and axes of stone are all found in direct contemporary association with Bronze age remains.

In view of these facts, I thought that it might not be without interest to review the whole position. So before entering into the local details of the discoveries in Eastern Essex, I propose to give some little consideration to the general principles involved in the classification of prehistoric remains.

If one is to begin at the beginning, the first point to be considered in this inquiry is the method of collection. As the whole superstructure of the science of prehistoric archæology is largely dependent upon the method of collection, its importance cannot well be over-estimated.

GENERAL REMARKS ON THE COLLECTION OF PREHISTORIC REMAINS.

May I, at the outset, put in a plea to all collectors of prehistoric remains, for the conscientious record of all details attaching to their discoveries, even although these may not appear to be important at the time? It is particularly desirable to investigate the association of various remains with each other. It is not enough to collect only the best and most skilfully wrought products, or those which look the most attractive in the cabinet, to the neglect of less symmetrical or less perfect objects which may be associated with them.

This is of peculiar importance in the study of prehistoric archæology. For while it is true that the collection of prehistoric objects in many cases saves them from destruction, yet it is none the less the fact that in the prosecution of prehistoric investigation, the accumulation of evidence necessarily involves the destruction of evidence. It should always be borne in mind in unearthing prehistoric remains that when once they have been removed from their original surroundings, they can never be put back into them. In other sciences the collection of evidence does not usually involve the destruction of evidence for future workers. For instance, the sun is not affected by the astronomer who photographs it through his telescope, and, from this point of view, it does not matter how badly he may do his work. The barrow that is excavated by the archæologist is destroyed for ever, and the quality of his work is of the utmost importance.

In dealing with surface finds, it is not enough to give the locality, but they should be collected in accordance with the way in which they are grouped in the field.

May I also put in a plea to the collector not to instigate a local trade in these remains? All may go well for a time, and the collector obtain more than he would by his own unaided work, but sooner or later the system nearly always leads to disaster. At first the arduous work of searching may only appeal to those

who have an instinctive interest in such things, but it soon gets into the hands of less satisfactory individuals, who have no interest beyond the money which their discoveries will command. The choicest specimens are purchased, often at high prices, by those who have only a temporary curiosity in such objects. The record of their locality disappears, and they become lost to science. As an instance of this, I was told some little time ago by one whom I chanced to meet that he formerly had many fine arrow-heads and other implements, but that he had lost interest in them, and in the course of various "spring-cleanings" and other domestic events they had disappeared. Another case came under my notice recently: two polished axe-heads were sent to the old clothes department of the Church Army among other superannuated lumber. Other similar cases have also come within my personal knowledge.

Such is the unfortunate result of trade in prehistoric remains. In addition to this, the circumstances of discovery are seldom obtainable in objects which are purchased: valuable scientific evidence is destroyed. And last, but not least, the locality becomes invaded by forgeries, which are occasionally even "salted" upon the ground, for the innocent collector to find for himself! the forger looking on from behind a hedge, and richly enjoying his nefarious joke!

The district here discussed is one in which stone implements were formerly very abundant. They were chiefly found upon the shore, where they had been washed out of the prehistoric deposits by the sea. It is now, unfortunately, a district over which one must inscribe *Ichabod.* To avoid possible disappointment one must say that the chances of a visitor finding anything to reward his search at the present time are very remote. I know of collectors who have heard of what has formerly been found, and have gone down to search, and found nothing. The black flint implements were easily seen on the white sand, and the whole place is now practically cleared.

I think that valuable scientific results might be obtained by organized spade work. If some necessary funds could be raised to start such an investigation, it would be well worth while to make the attempt.

There is one other general point on the collection of prehistoric remains to which I wish to refer. This is the extent to which collection, the primary source of our information, is coloured by theory. If, for instance, we find bronze in a round barrow we accept it as contemporary, as a matter of course. If we found the same thing, under the same circumstances, in a long barrow, we should say it had been subsequently introduced. It is an act of caution to require stronger evidence in the case of things which are not generally accepted than in the case of those things that are familiarly known. But it is a caution which may be pushed too far. Let us take the case of the West Kennet type of pottery, already mentioned. Now such a highly developed technique and ornamentation cannot possibly cover a prolonged period of time. Pitt-Rivers, trusting his own observation, concluded that it was a round barrow type, and that it had been subsequently introduced into the Long Barrow of West Kennet. But the view which may be considered to be the

orthodox one is that it is a long barrow type, and that Pitt-Rivers was mistaken. But suppose we take both observations as correct, and do not try to explain either of them away by pre-conceived theory? Then the Long Barrows and the Round Barrows are found to be, in some cases at least, contemporary with each other, as held by so high an authority as Mr. J. R. Mortimer.

To a large extent it is one theory hanging upon another, and it is difficult to know which to take as the more trustworthy. This is a point which I am bringing up for a special purpose, to which I shall refer later.

THE DIFFICULTY OF CLASSIFYING SURFACE FINDS.

In his work on *The Ancient Stone Implements of Great Britain*, Sir John Evans used the term Surface period as synonymous with the Neolithic age. I think that it would conduce to greater precision of thought if this term were used more generally, and in a somewhat wider sense.

There can be no doubt that the stone implements which we find upon the surface, and usually class together as Neolithic, cover a very considerable period of time. The barrows of the Bronze age yield stone implements in contemporary association with bronze. If these stone implements were found upon the surface we should, as a matter of course, consider them to be Neolithic. Indeed, there is little necessity to enlarge upon this fact, as it is fully admitted. No one will call in question the truth of the statement that large numbers of the Surface stone implements which we classify as Neolithic must in reality belong to the Bronze age. Further than this, it is equally certain, although perhaps not so generally insisted upon, that many waste chips and rudely worked flints are nothing more than the product of the flint knapping which has been carried on for various purposes during the progress of historical times. On the other hand, some of our surface stone implements belong, in all probability, to the Palæolithic age.

This being so, it would be more scientific to classify our surface finds together as a Surface series, which they are, rather than as Neolithic, which many of them are not. We do not yet know with any degree of certainty what the distinctive features belonging to the Neolithic series may be, nor do we really know if any such distinctive features exist. Various points have been noted in the investigation of the barrows, by which it has been concluded that the perforated stone axe-hammers, and possibly also the barbed arrow-points in flint, are exclusively of the Early Bronze age. But this, even if trustworthy, does not take us very far.

The widespread classing of objects as Neolithic, many of which are not Neolithic, is calculated to blind us to evidence which might otherwise be apparent. If we ruled out the surface finds from definitely taking their place in the Neolithic series, and classed them as Surface (which might or might not be Neolithic), it is true that there would not be much left which could claim the

more definite title. This, however, in showing us clearly how we stand in the matter, would not be any real loss to our science.

We are badly in need of some satisfactory method of defining the relative ages of our Surface series. Many workers class the ruder forms as earlier than those which are more symmetrical and better finished. But this method, especially where it entails the selection of the ruder individuals of the same local group, does not appeal to me as a satisfactory one. Even where the rude forms are distinctly grouped together, their rudeness may well be due to some other cause than age, as, for example, to the special abundance of raw material, or to the particular industry for which they were used not requiring anything better. Or if due to age, the rudeness may be due to the age being a late one, rather than an early one. In Egypt the finest flint-working is early; after the increased development of metal-working rendered the flint tools less important, their workmanship degenerated and became ruder. The same thing probably happened in Europe.

At the same time, I fully believe that much may be done by a careful comparison of the manner in which various types are grouped together in the field, and also by the study of reworked implements. I have myself been engaged for some years past in the investigation of the surface implements of a district which presents highly suggestive features in the manner in which they are grouped in the field, but it is not my purpose to bring this evidence forward here.

The late Mr. J. Allen Brown, in a paper brought before the Anthropological Institute in 1892,[1] endeavoured to maintain that the ruder forms of the South Downs were Mesolithic. More recently, Monsieur A. Rutot has defined as Flénusien a series of rude forms which he believes to be pre-Neolithic. Some examples of these may be seen in the British Museum. The forms are probably familiar to most field workers, and are found in this country as well as on the Continent.

In considering rude forms one must always remember that flint chipping, for various purposes, has been going on extensively throughout historic times, while besides this deliberate working of flint, flints have been broken on a large scale artificially, but accidentally, in the course of hoeing, ploughing, and other agricultural operations. There can scarcely be a doubt that we are accumulating large numbers of both of these groups in our cabinets under the label of Neolithic, and, if we take mere rudeness as a test of age, we may well be led into placing them still earlier in the prehistoric succession.

The Evidences of Barrows.

In the evidences obtained from barrows we are saved from much of the uncertainty which attaches to surface finds. At the same time it is always highly desirable to supplement this. It is a somewhat unknown quantity how far the funeral furniture may faithfully and adequately represent the common instruments

[1] J. A. Brown "On the Continuity of the Palæolithic and Neolithic Periods," *Journ. Anthrop. Inst.*, vol. xxii, 1892, p. 66.

of daily life. There is also the frequent poverty in funeral furniture which makes the comparison of one site with another a matter of great difficulty. It is very much to the credit of archæology that in spite of these limitations and difficulties a large part of the solid information we now possess has been gleaned in this field.

THE VALUE OF GEOLOGICAL EVIDENCE.

In spite of all the work which has been done in the investigation of barrows and sepulchral antiquities: in spite of the useful and valuable results which are obtainable from the comparative study of the grouping and distribution of surface finds in the field, there is yet another sphere of research which has not hitherto, except in the case of the Palæolithic period, received the share of attention which it deserves. There is a simplicity and directness in the geological evidence of stratigraphical succession which is not shared by either of the methods previously referred to.

We have seen, in discussing methods of collection, how in the investigation of the barrows one theory hangs upon another, how observations even are coloured by the theory that may be favoured.

It was the stratigraphical evidence of the peat bogs which enabled the Danish and Swedish archæologists first to establish a definite succession of prehistoric culture-stages based upon sound scientific principles. Yet, if we turn to-day to any general discussion upon the classification of the surface series, we seldom find that stratigraphical evidence takes a prominent place.

This class of evidence has, of course, its special limitations. It is only in favoured localities that it is available. Yet, in my opinion, it would be as well worth while to undertake systematic investigation by means of spade work upon these lines, as in the case of sepulchral antiquities or on the sites of camps.

THE CLASSIFICATION OF THE PREHISTORIC AGES.

On more than one previous occasion I have advocated the desirability of adapting the sequence date system, which has been used with such remarkable success by Professor Flinders Petrie in Egypt, to the prehistoric succession of Western Europe.[1]

In making this suggestion it will be fully understood that it does not entail starting a revolutionary scheme of new periods with new names. The classifications used by different authorities at the present time vary slightly in nomenclature and in minor details, but in their broad outlines they are all essentially in agreement. I take these broad outlines as they stand, because I believe them to be as correct as the present state of our science can make them.

[1] S. H. Warren, *Geological Magazine*, 1902, p. 97 ; *Essex Naturalist*, vol. xvi, 1911, p. 279.

I simply advocate the adoption of the newer sequence date system as a subsidiary means of expressing the facts, and as a convenient and practical method of tabulating results.

But although, in this sense subsidiary, I believe that its adoption would result in important and rapid advances being made. It is a system which gives precision of definition where precision is obtainable, while, on the other hand, it can express with equal terseness and clearness the indefiniteness of our information where precision is unattainable. It expresses to a fine degree of exactitude the best result that the evidence enables us to obtain. It never misleads.

The conviction has been growing upon me that as we cannot in practice confine archæological discoveries within the limits of fixed periods, it is a mistake to attempt to do so in theory. An ever increasing volume of discoveries has to be referred to conveniently indefinite transition epochs. It has struck me, as I have no doubt that it has struck others, that the difficulties of classification increase with the richness of the material. An extensive series of remains covering a wide period of time cannot satisfactorily be grouped into fixed periods without greatly increasing the number of these periods and reducing the successive differences between them almost to vanishing point. It constantly happens that stations which have long been thought to belong to the pure Stone age, and are undoubtedly earlier than the true Bronze age, have sooner or later yielded bronze of local manufacture. Some class these in a transition epoch, but not infrequently they are transferred from the Stone age to the Bronze age, and thus the reality of the succession between earlier and later stations becomes confused.

The impossibility of fitting observed facts into the theoretically fixed culture-stages has led to the unhappy expression of "overlap" between the periods. If two successive culture stages really "overlap" each other, it is the apparent succession that is illusory; the two supposed stages must actually be contemporary in so far as they "overlap."

As a matter of fact our prehistoric remains do not belong to a succession of more or less fixed periods, with "overlaps" between them. Or, at least, this is a confusing and unscientific way of expressing their relations. That which we are dealing with is a developmental succession, and that which we want is a system which shall express this.

The sequence date system, as shown on the accompanying table, would take certain prominent phases in the prehistoric developmental succession. It would give to these a series of arbitrary numbers, at intervals of a decade apart, and these would form the outline of the sequence date scale. The successive decades would not profess to represent equal time values, but a certain approximation to equal advances in the development of culture.

This system can be followed out, if necessary, to decimal places, and is thus infinitely elastic at every point. It avoids the need of intermediate periods, which we shall otherwise see springing up, in ever increasing quantity as time goes on.

TABLE OF SEQUENCE DATES.

Periods.	Sequence Dates.	Proportion of Metallic to Stone Axes.	Range of Beaker.	Range of Cremation.	Range of Cinerary Urn.	Date of Earlier Series.	Date of Later Series.	Date of Tidal Silt.	Approximate Egyptian Dates.	Montelius. Stages of La Tène, Hallstatt, and Bronze Age.	Montelius. Dates B.C.
									B.C.		
Roman occupation ...	[10]									L.T. III.	
											150
Epoch of La Tène ...	[9] 90									L.T. II.	
											250
										L.T. I.	
											400
										Hal. II.	
									600		600
Hallstattien	[9] 80									Hal. I.	
											850
										Br. V.	
											1150
Larnaudien or Later Bronze age.	[9] 70	100:0								Br. IV.	
											1400
									1700	Br. III.	
											1500
			62		62					Br. II.	
Morgien or Early Bronze age.	[9] 60	50:100					58	60			2000
				57							
			55								
Robenhausien ...	[9] 50	1:100				50	50			Br. I.	
									4500		+2500
	[9] 40					40 ?			7000 ?		
Pre-Robenhausien ...											
	[9] 30										
? Azylien	[8]										
Magdalénien ... ... (Aurignacien of Girod)	[7] 90										
Solutréen ... .. (Aurignacien)	[7] 80										
Moustérien	[7] 70										
Acheuléen	[7] 60										
Chelléen]	[7] 50										
	[7] 40										
Early Palæolithic ...											
	[7] 30										

Its chief drawback is that the main outlines of a sequence date scale, when once defined, can never be altered. But as it is infinitely elastic at every point this is not likely to prove a very serious inconvenience. The scale given now is the same as that which I originally proposed in 1902. The only modification made here is the addition of integer numerals in brackets[1] to separate the larger groups of periods. These begin at the top of the scale at 10 for the commencement of historical times in this country, and work backwards through the Palæolithic period.

It may perhaps be thought that it would be simpler to eliminate the brackets and read simply 730 or 950, or whatever it might be, instead of [7]30, [9]50. But this would not correctly express the relations. The scales for the Palæolithic period, for the Recent Prehistoric group, and for anything that may be needed between these two, are respectively independent of each other. Each scale, when first established, begins conventionally at 30, in order to leave space for future discoveries. These future discoveries may fill up more decades in one scale than in another. One scale may need to be carried to 120 or 130, while another may stop at 80. The time, defined as [8], between the Palæolithic and Recent periods is still largely an unknown quantity—an hiatus in our knowledge. The whole scale must, therefore, be left elastic at its middle parts as well as at the beginning and the end. Further, many of the decades will probably always remain silent. Thus to read straight through from beginning to end in hundreds would not be correct.

In starting the Sequence Date scale I have not used the newer and more highly elaborated system of Dr. Montelius.[2] The same facts are represented, but for many reasons it seemed more convenient to retain the more time-honoured system as the essential basis of the scale. The equivalents in the system of Dr. Montelius are given in the last column.

For the sake of uniformity the Palæolithic scale is likewise given in the table, but, as this does not concern us here, it will not be considered in detail. The details of the later part of the scale are worked out solely with a view to elucidating the age of the prehistoric remains of Eastern Essex.

In fixing the principal "dates" of the scale the first archæological unit considered is the axe. In dealing with this part of the scale it is unnecessary to repeat the first numeral. It is understood that it is [9] in every instance. The definition of the main fixed points in this part of the scale is as follows:—

s.d. 50. Proportion of metal axes to those of stone, 1 : 100. The metal axes are all of the primitive flat type, usually of copper. The metal is shown to have been of local manufacture in Europe from the discovery at Robenhausen, which is, if anything, earlier than this (possibly s.d. 48 or 49), of the moulds for casting and the crucibles with the remains of the melted metal still in them.

[1] It is perhaps neater, and more convenient for some purposes, to separate the first integer numeral from those that succeed it, by a decimal point, rather than by brackets.

[2] O. Montelius, "The Chronology of the British Bronze Age," *Archæologia,* vol. lxi, 1908, p. 97.

s.d. 60. Proportion of metal axes to those of stone, 50 : 100. The metal axes still continue to be of the primitive flat or flanged types, and some of them were probably still made of pure copper, although the majority are of bronze.

s.d. 70. The central line of the Later Bronze age, with its axes of the winged and socketed types. Stone has now practically gone out of use for the purposes of the axe.[1]

On reaching the stages of Hallstatt and La Tène the scale is of less practical value, as it is then possible to define actual dates with a fair approximation to accuracy. In fact, the progress of discovery relating to these periods upon the Continent has perhaps already outstripped the sequence date system. But the point s.d. 90 may be taken as approximately equivalent to about 200 B.C., and s.d. 80 to about 500 B.C. In the case of objects which cannot be more precisely dated, it may be useful to define their relative age on this basis.

With regard to the earlier part of the scale, it is scarcely possible as yet to give a precise definition to anything earlier than s.d. 50. In view of the fact, that in order to secure an efficient system, a precise definition, when once made, should never be altered, I feel it to be wiser to make no such definition at present. Further research in the Swiss lake dwellings which are considered to belong to the Tardenoisien stage, or a further examination of our own recent geological deposits, may elucidate the matter in the future.

There can be no doubt that metal axes, of copper at least, if not of bronze, were cast in Europe long before s.d. 50, while ornaments of copper would probably be cut and hammered very much earlier still. If one were to space out the decades upon a scale equivalent to that already fixed, I very much question if a pure Neolithic age can have existed after about s.d. 30. Whether such a strictly pure Neolithic culture stage has ever existed in Europe may indeed be open to some doubt. The fact that an occasional rare piece of metal is found at stations which would otherwise be considered pure Stone age, must shake our faith in negative evidence elsewhere. The absence of the discovery of metal from stations, which are otherwise similar to those that possess it, may be purely accidental.

In all this work we see the advantage of a sequence date scale over a fixed idea of metal or no-metal.

It may not be out of place here to consider briefly the comparative conditions in Egypt. No pure Neolithic culture has yet been discovered in that country. In the earliest prehistoric times yet defined, s.d. 31 of Flinders Petrie's Egyptian scale, copper ornaments were already in use. This may have been about 7000 B.C.,

[1] It appears to me that Dr. Montelius somewhat exaggerates the scarcity of stone implements from certain stages of the Bronze age (*Archæologia*, vol. lxi, p. 113). I believe that stone implements have been frequently overlooked in the digging of barrows, etc., where they were actually present.

or earlier. At the commencement of historic times, between 4000 and 5000 B.C., copper was in common use for the making of chisels and other implements. Bronze first came into general use in the XVIIIth dynasty, at about 1700 B.C., while iron in its turn superseded bronze in the XXVIth dynasty at about 600 B.C.

We have, then, in Egypt an early culture period, stretching back to an indefinite and unknown antiquity from about 4500 or 5000 B.C. During this time stone was the material in common use for the making of implements and weapons. The use of copper was, however, gradually being developed throughout this period, even from its very beginning, so far as this has yet been traced. Most, if not all, of this early metal working was, however, done by cutting and hammering, and not by any process of true metallurgy. Thus, the state of metal working in Egypt in 5000 B.C. was actually less advanced than in the epoch of Robenhausen in west-central Europe. This is a fact of very great importance, for unless we assume that metallurgy was practised in Europe for many thousands of years before it was known in Egypt, it practically destroys all extravagant claims for the remoteness of the Neolithic age in Europe or in this country.

One cannot expect the corresponding archæological stages in Europe and in Egypt to synchronize precisely. I am not straining the evidence so far as that. I merely mean that as the metallurgy of the epoch of Robenhausen is higher than in Egypt at the date 5000 B.C., it is unreasonable to put back the epoch of Robenhausen in Europe to an antiquity of 10,000 or 15,000 B.C.

If this be sound, it must undoubtedly reflect upon the Palæolithic age, which cannot be so remote as it is sometimes claimed to be.

That some approximation of the dates in Europe and in Egypt may reasonably be surmised is confirmed by the dates of the Bronze age in the two areas. In Egypt, the Bronze age (or the nearest equivalent to the Bronze age) commenced about 1700 B.C., and closed in 600 B.C. These dates agree fairly well with the corresponding stages in Europe. The dates suggested by Montelius for the earlier stages are probably, in my opinion, an underestimate for west-central Europe or Britain. I think they should come nearer to, or even slightly exceed, the corresponding stages in Egypt.

It is usual to compare the dates of the fully developed Bronze and Iron ages in Europe with the first rare pieces of bronze or iron known from Egypt. This is an unfair comparison. Bronze was certainly known in Europe, as it was in Egypt long before it came into general use. The same was probably the case with iron.[1]

The earliest piece of bronze in Egypt is a rod found at Mêdûm, and believed to date from 3700 B.C. It is probable that the more advanced bronze workers of Robenhausen were earlier than this. So on this standard of the earliest use of the metal, it is possible that Europe may have the advantage.

[1] Since this paper was read an important discovery bearing on this point has been made in Egypt. Messrs. G. A. Wainwright and Bushe-Fox have found contemporary iron beads in the grave of a pre-dynastic Egyptian dated by the pottery to about s.d. 53–63. See a preliminary note by Mr. G. A. Wainwright in *Man*, 1911, 100.

The point that I want to make particularly clear is that although Europe may have some slight advantage, I do not think we can make the advantage an enormous one. I think we can take the Egyptian dates as a guide, to a certain degree, and as a check to speculation.

The epoch of Robenhausen is almost universally taken as typical of the "Neolithic" age. I must, therefore, take it as one of the principal points of departure in endeavouring to estimate the age of the prehistoric remains of Eastern Essex. These remains themselves are intimately associated with striking events in the recent geological history of our country. There is also the discovery, presently to be discussed, of a prehistoric skeleton in a remarkable state of preservation; so that anything like a reasonable approximation to their probable date is a matter which opens up many points of very great interest. It is for this reason that I have entered somewhat fully into the foregoing discussion.

It is customary to suppose that the Neolithic age was of very long duration. This idea is supported by the enormous numbers of surface stone implements which are strewn over the country. In deference to this view, a wide space is left below the first definitely fixed point taken nearly on a line with the station of Robenhausen. The sequence date system conventionally begins at 30, in order to leave room for future discoveries of earlier stages. In this case two more decades are allowed before fixing the line of " one per cent. of bronze axes " at s.d. 50.

I have taken this course, as it seemed to me the wisest one to adopt, in order to leave abundant space for future discoveries. At the same time I do not know that the inference regarding the length of the Neolithic age, founded upon the abundance of the surface stone implements, is of much value. It is hardly logical to infer the length of a period from the abundance of certain remains, when a great number at least of these remains do not belong to that period at all, but to earlier and later stages.

Upon the continent of Europe various stages, such as the Azylien, the Campignien, and the Tardenoisien, have been suggested by various authors to come in between the Magdalénien and the Robenhausien epochs. These suggested stages are scarcely above the sphere of controversy; this branch of the subject is at present very obscure.

Although (derived) Palæolithic implements come into close proximity with the Surface Series in the superficial deposits of Eastern Essex, I have not found any suggestion of a transition between them.

THE RECENT GEOLOGY OF EASTERN ESSEX.

In order to make clear the circumstances under which the prehistoric remains of Eastern Essex have been found, it will be well to give a brief description of the superficial geology of this part of England, and of other similar situations round our coasts. In several successive communications made to the Essex Field Club, I

have dealt with various local details of these superficial deposits.[1] In the present place I shall take a broader line, and endeavour to picture something of the more recent geographical changes of our country, as these particularly affected the conditions of life of prehistoric man.

In its physical features the district of Eastern Essex has been formed out of a slightly undulating plateau, which has a gentle inclination towards the sea. This area is occupied chiefly by London clay, although several outliers of the Crag formation are found upon its northern borders. Its average elevation is about one hundred feet above the sea level: being rather less near the coast and rising slightly inland.

Upon this plateau there are irregular patches and pockets of drift gravel, sometimes containing the remains of Pleistocene mammalia and Palæolithic implements. The surface of the plateau is deeply trenched by a series of river valleys, which are later than the Palæolithic gravels, and have no present connection with them.

These valleys, in conformity with the whole valley system of the south of England, were originally cut far below the present level of the sea. At the time of their excavation the land stood at least 100 feet higher than it stands to-day, and possibly much more than this. Indeed, it is not unlikely that the shore line, at this date, may have approximated to the 100-fathom contour beneath the sea. Upon the floor of these valleys there are a series of low-level marsh and other deposits, sometimes with associated peats and buried forest growths. The earliest of these low-level deposits date from the age of the mammoth[2] and belong to the closing phase of the Pleistocene period in this country. These deposits are traceable at a little above low-water mark on the shore near Walton-on-Naze and Clacton-on-Sea.[3] The former exposure has not, I believe, been seen for many years. The latter is still to be seen and yields flint implements of somewhat uncertain age and affinities in association with *Elephas antiquus*.[4] The stratigraphical position of these implements, however, fixes them in the scale between the broad limits of s.d. [7]90, and a theoretical value of [8]90.

The Late Pleistocene peats are of some importance in our present enquiry, as care must be exercised to separate them from those which are of a later age. It is, however, the later series which more immediately concerns us.

[1] "Notes on the Palæolithic and Neolithic Implements of East Essex." *Essex Naturalist*, vol. xvi, 1907, pp. 46–51, Pl. II–VII. "On the Correlation of the Prehistoric Floor at Hullbridge with Similar Beds Elsewhere," *ibid.*, vol. xvi, 1911, p. 265 ; compare also "Notes on the Palæolithic and Neolithic Implements of East Lincolnshire," *Man*, 1907, 89.

[2] S. H. Warren, *Essex Naturalist*, vol. xvi, 1911, p. 273. Remains of the Pleistocene mammalia have been recorded from below the prehistoric alluvial deposits in a great many localities, too numerous for separate mention.

[3] A general account of these beds, with references, will be found in the memoirs of the Geological Survey on the Colchester District, and on the Eastern End of Essex. See also H. Slopes and W. H. Dalton, "Notes on the Geology and Archæology of the district of Walton-on-Naze and Clacton-on-Sea."

[4] S. H. Warren, *Quart. Journ. Geol. Soc.*, vol. lxvii, 1911. *Proceedings*, p. xcix.

After this valley system was trenched, during an epoch of elevation, submergence set in, and the lower reaches of the valleys were invaded by the sea. This submergence did not take place suddenly to its full extent. There were intermittent pauses in its operation, sufficient to allow of the formation of a succession of peat beds, intercalated between the tidal silts. These earlier peats, representing a succession of buried surfaces, exist only below the present level of low water, and are consequently older than that which is commonly seen on the shore above that line. In consequence of their low position, they are only seen during the progress of deep artificial excavations (such as those of the Barry Docks in South Wales) which are carried down far below the level of low water.[1]

We have no evidence to show at what period this submergence commenced, as the record now lies beneath perhaps 50 or 100 fathoms of water. But the date of its final stage can be approximately fixed by the prehistoric remains which are found upon the ancient surface which was then carried beneath the sea. In my opinion it is probable that this submergence is the foundation of the legends of the Fabled Land of Lyonesse.

It is upon the submerged surface, which I have proposed to name the "Lyonesse" surface that large numbers of prehistoric remains have been found. It is to this that the interment, to which reference has already been made, also belongs. The following table gives the full succession of the marsh deposits of Eastern Essex, so far as these have yet been worked out:—

i. Present salting surface:—
h. Tidal silt, or *Scrobicularia*-clay with briquetage of Red-Hill type.
g. Peat.
f. Buried prehistoric surface.
e. ⎧ Grey marsh clay.
d. ⎩ Rainwash.
c. Pleistocene brick-earth, with occasional erratics and derived palæolithic implements [= the trail].
b. Layer of shattered septaria.
a. Grey marsh clay with *Elephas primigenius* (there are also peat beds on this horizon).[2]
x. London clay.

It must, of course, be understood that these various deposits are never all present at any one spot. The buried prehistoric surface rests sometimes on pre-existing brick-earths or marsh deposits (*c, d, e*), sometimes on late pleistocene peats or other deposits with remains of the mammoth (*a*), and in certain localities upon lower tidal silts coming into the succession between *b* and *e*.

The buried prehistoric surface is intimately associated with the peat (*g*), but usually occurs distinctly beneath it.

[1] A. Strahan, *Quart. Journ. Geol. Soc.*, vol. lii, 1896, p. 474.

[2] The important series of pleistocene deposits at Clacton are excluded from consideration here. They come into the succession below the bed *a*.

That this surface was inhabited by prehistoric man, down to, and probably far below, low-water mark, is proved beyond a doubt by the prehistoric remains now found upon it. Stone implements are generally distributed over this surface. They are sometimes scarce, sometimes concentrated in considerable numbers upon small areas. Not infrequently the sites of hearths are found; sometimes there are small pits about three feet in diameter and about two feet in depth, the interior filled with wood charcoal, the edges showing much evidence of fire. I suggest that these may possibly have been used for burning pottery. I have found several such on the buried prehistoric surface of East Essex.

As I have previously pointed out, the archæological remains found upon this ancient surface possess a peculiar value for purposes of classification, because, in many situations, at least, they are confined within a comparatively narrow range of time. This surface being buried beneath thick accumulations of tidal silt, the remains upon it have been preserved from any subsequent disturbance, or from the admixture of later objects. The whole surface, which covers scores of miles beneath the salting areas, remains to-day just as it was when abandoned by prehistoric man. The flint implements upon this surface are peat-stained from the percolation of water passing through the superincumbent beds. But it is remarkable that very few of them show any sign of weathering upon their worked surfaces. They certainly have not lain for any considerable period of time in the then surface soil, but must have been buried under the overlying peat very soon after they were dropped by the men who used them. Gun flints which cannot be many centuries old, frequently show far more surface weathering than these prehistoric implements. If these implements covered a prolonged period of time, we should find that some would be greatly weathered, while those lost just before the submergence took place would be comparatively fresh.

There is also further evidence on this head. The buried surface very commonly lies upon rainwash or marsh clay belonging to an earlier part of the Recent period. And these earlier deposits themselves not infrequently contain implements of polished stone, forming an earlier series of prehistoric remains. Occasionally the surface lies upon the bare country rock, and then it may include remains belonging to an earlier stage. This is a possible source of error that needs to be discounted. But as a general rule the remains upon the buried prehistoric surface may be taken to be confined within narrow limits of time upon either side.

In the foregoing description I have endeavoured to show that there is one particular ancient surface, now buried beneath the tidal silts of the marshes, which is of very great importance from an archæological point of view. This is found not only in East Essex, but also in Lincolnshire, Devonshire, Somersetshire, and elsewhere.[1] It is most commonly seen exposed between tide marks on low-lying shores, where erosion of the mud flats is taking place.

[1] For a general account of those discoveries, with references to the literature of the subject, see S. H. Warren, *Essex Naturalist*, vol. xvi, 1911, p. 266.

Our prehistoric ancestors lived upon this surface at a time when the whole of the southern part of Britain stood at a higher level, relatively to the sea, than it stands to-day. As submergence set in, the first effect was that the rivers began to lose the freedom of their flow into the sea. Their waters were to some extent ponded back, and the result was the formation of wide-spread swamps. Upon these swampy surfaces the peat was formed which now immediately overlies the buried prehistoric surface. Occasionally prehistoric remains, similar to those upon the surface below, are found in the peat itself. This shows that the same men still continued to roam over the old surface, although it had now become too wet and swampy to afford a favourable situation for permanent abode. As submergence proceeded, these low-lying areas became invaded by the sea itself, the evidence of which we find in the tidal silts with their *Scrobicularia,* and other marine organisms. As I have already suggested, it seems to me not improbable that it was then that man saw his "Land of Lyonesse" overwhelmed by the hungry sea.

The geological conditions are, however, complicated by the fact that where artificial excavations are carried below low-water mark, lower surfaces (represented by peat beds) are encountered. These are undoubtedly older than the surface which, for the sake of distinction, I have ventured to name the Lyonesse surface. The conditions are further complicated by the fact that there are also other, older peats, dating from the age of the mammoth, which were underlying the "Lyonesse" surface when man was living upon it, but which might now be very easily confused with it. The diagram, page 122, will make the general relationship of these various deposits clear.

The next most valuable bed from an archæological point of view is the rainwash (*d* in the table of strata). This contains prehistoric remains which present some differences from those found upon the buried prehistoric surface which overlies it. The details of these differences will be dealt with in the next section of the paper.

This rainwash, as its name implies, has been brought down into the valleys by the wash of the rain, and the general surface drift of atmospheric agencies. It is spread out at the foot of the side-slopes of the valleys, and passes for some distance beneath the buried prehistoric surface, with its associated peat. As might be anticipated, it does not extend to the more central parts of the valleys, but seems to become replaced by the marsh clay (*e* of the table). As these two deposits appear to be in great part contemporary with each other they are bracketed together in the table of strata.

Some further geological details relating to these deposits have been given in the papers previously referred to, but these are not of any importance for the purposes of the present paper, so it is unnecessary to refer to them here.

THE EARLIER SERIES OF IMPLEMENTS OF EASTERN ESSEX.

These belong to the rainwash deposit marked *d* in the diagram and in the table of strata. It has already been remarked that while the implementiferous strata are often traceable over considerable areas, it is yet only at certain spots that the implements are found in any abundance. These abundant sites are dependent, not only upon the existence of the prehistoric remains in the deposits, but also very largely upon the accidents which chance to bring them to light at the present day.

Upon some sites one may find the Earlier Series to be exclusively represented, upon other sites there may be both deposits with both series of remains. Upon the latter sites, where the two series have been washed out of the deposits by natural causes, one has only their mineral condition as a guide in distinguishing the one from the other. This is, on the average, indeed in the vast majority of cases, a safe guide. There are occasional instances, however, in which it might lead one astray. Further than this, specimens are sometimes found which have been upon the present surface sufficiently long to become weathered. When this is the case, it is a little difficult to decide to which of the two series they should be referred. This is a possible source of error to which it is well to draw attention. It is an error which might affect individual specimens, but would become negligible when dealing with averages.

Material.—The flint of which the implements are made appears to be exclusively of local origin. Most of it is the stained and altered flint that can be obtained from the drift deposits of the district. Some of it was obtained from the beach of the sea, so it is probable that the sea-board, even at this time, was not many miles from its present position. Implements made of chert are occasionally found, but they are very rare. This also would be obtainable from the local drifts.

Mineral condition.—When found *in situ* in the rainwash, the implements are remarkably fresh, and but little altered in condition from what they were when originally made. They were certainly buried in the deposit while quite fresh. Upon exposure to atmospheric agencies they generally assume the familiar blue-and-white mottled patination. Gun flints found side by side with them under the same conditions assume much the same alteration of the surface.

Cores.—Small but rough flints, presenting a greater or lesser number of facets from which flakes have been removed in an irregular manner, are abundant. Occasionally parallel facets are seen from which flakes have been removed by a somewhat more regular method. I have not seen a long thin prismatic core, showing really good work, neither have I seen one worked from both ends. The scarcity of workable material is forcibly suggested. The cores have usually been worked down to the last possible point of usefulness, many of them being only 25 mm. in diameter, and but few of them being over 50 mm. Not improbably some may have been worked up to serve the purpose of rude implements, for some temporary or "make-shift" use.

Flakes.—In our just admiration of the beauty of form, and of the skill displayed in the elaboration of workmanship of the rarer forms of stone implements, we are a little apt to lose sight of the practical value of the simple flake in prehistoric times. The simple flake was the standard cutting instrument of prehistoric man. We are sometimes apt to think too much of secondary work. When the instrument was required for cutting, the secondary work, where this is present, not infrequently forms the back of the blade, not the cutting edge. If the worker was sufficiently skilful to obtain his edge at the primary blow, such an edge is far keener than anything that can be produced by secondary chipping. It therefore appears to me that the flakes, which were originally of such paramount importance, are always worth careful consideration. The flakes of the Earlier Series of East Essex are mostly small, few of them being more than 50 mm. in length, and many of them are less than half this amount. A considerable number are rather thick, and triangular in section, but "flat" flakes are also abundant. The flakes are distinctly better than one would have anticipated from an examination of the cores. Some of the best flakes may have been made elsewhere; but the feature cited may be due to the cores having been worked down very far, long after the best results could be obtained from them. Still, really good work is scarce; thin flakes with parallel facets on the outer face and keen straight side-edges being nearly or quite as rare as arrow-points. The cones of percussion are not generally very pronounced.

Flaking angle.—By the flaking angle I mean the angle at which the core was worked. That is to say, the angle made between the upper striking plane and the side face from which the flakes were being removed. This angle may be measured either on the cores, or on the flakes where these retain a portion of the striking plane. By far the greater number of the flakes that we are dealing with here do not present this feature, still there are some that do, so that taking the flakes and cores together, a considerable number of measurements have been taken. These angles vary considerably, the lowest being 58°, and the highest 90°, the average being about 74°. This is about the natural angle of flint flaking, which likewise varies considerably according to circumstances. By the natural angle in this sense I mean the angle at which flint will flake the most easily. It is always difficult to work at the higher angles, but undoubtedly it is only at the higher angles that the best work can be done. This matter will be further illustrated when describing the later series.

Scrapers.—These instruments also are small, the greater number being from 25 to 40 mm. in diameter. The familiar short horse-shoe type is abundant, although unusually small, but the scrapers of this series are chiefly characterized by the prevalence of small side scrapers. These are worked to a curved edge along one side of the flake, instead of round the end. There is no uniformity in the choice of the edge. Sometimes both edges are used, and occasionally both edges and the end, when they pass to a different type. There is a strong tendency to carry the chipping round to the end of the flake in an involute curve, when they approach

the oyster-shell type. They rarely measure more than 33 × 26 mm. Elliptical, straight-edged, and angular scrapers also occur. The latter have two edges bevelled by chipping (one, if not both, of which is usually a straight edge) meeting at a well-defined angle, or blunt point. Some of the scrapers are of truly pygmy dimensions. One beautiful little instrument in my collection measures only 18 × 16 mm., and is neatly worked to a bevelled edge all round its periphery. There are others more or less similar to this. (Plate XV, Figs. 23–26.)

Hollow scraper series.—There are few, if any, examples that can safely be classed as hollow-scrapers. Even flakes with small notches in their edges are very rare. It is always a matter of very great difficulty to distinguish genuine hollow-scrapers and notched flakes from those which have acquired these forms by accident.

Trimmed flake group.—Flakes with trimmed edges, or with their ends or edges worn away or smoothed by use, are found here, as on all prehistoric sites, but there is little that calls for special mention. One flake in my collection has a minutely serrated edge with about twenty-eight teeth to 25 mm. The chips producing these serrations are all removed from the inner face. It is a thick ridged flake, of triangular section, and measures 50 × 24 × 14 mm. in length, breadth and thickness. It is far too thick to be of the slightest use as a saw.

Knife series.—In this series I include the Ulu form,[1] the long curved and lineate knives, the so-called dagger type, and the smaller ovate and lanceolate instruments which more or less resemble arrow-points. I have little information at present with regard to this series. One or two examples in my collection closely resemble the small rude rhomboidal form, to which reference will be made in dealing with the later series of implements.

Spear-points.—Judging by the analogy of modern savages, the typical spear-point is a pointed flake, either without secondary chipping or with only so much as may be needed to produce the required form. The greater the skill with which the flake is struck off, the less secondary working is necessary. It is impossible to draw a hard and fast line between flakes that were cutting instruments, and those that were spear-points. As a matter of fact, however, this is equally so in the case of the more elaborately wrought examples, many of which were used as knives in short handles, and not as spear- or arrow-points.[2]

All that one can do to arrive at a reasonable judgment in such cases is to get together as large a group of similar forms as possible, and endeavour to discover the central idea that the workers had in mind. I have some, but not very many, that could come into the class of flake spear-points among the remains we are now considering. There is one very typical example measuring 64 × 18 × 8 mm. It is made from a ridged flake, slightly retouched on one side of the point, while the

[1] O. T. Mason, *Annual Report of the Smithsonian Institution* for 1890 : Report of the U.S. National Museum, p. 411.

[2] C. C. Abbott, "Report of the United States Geographical Surveys west of the One Hundredth Meridian," vol. vii, *Archæology*, 1879, p. 59.

base is chipped into a pronounced tang. The edges of this are too obtuse to make a useful cutting instrument, but as a spear-point it is admirable. (Plate XIV, Fig. 9.)

Arrow points.—I think there is no doubt that a large number of simple flakes were used to serve the purpose of arrow-points. Such forms which appear suited to this purpose are not abundant in the Early Series of East Essex. Next to these come flakes with just sufficient modification of the edges to produce the required form, but without any surface flaking. These are fairly abundant. They are usually triangular in shape, about 30 mm. long, 20 mm. wide at the base, and 4 mm. or less in thickness. They of course vary in relative proportions and size, but the measurement given is a common average. The secondary work is often confined to a few small chips on one side of the point. The diagram, Fig. 1, illustrates the idea of a thin splinter of flint brought to a point by chipping along the dotted line. Nearly associated with these are forms produced by the same technique, but having an oblique chisel edge in place of the point. (Plate XV, Figs. 16–20.)

Fig. 1.

The leaf-shaped arrow-heads with surface flaking are usually rather narrow and somewhat thick, one measuring 38 × 15 × 4·5 mm. is very characteristic. Some are broader and thinner, as 31 × 22 × 3 mm. Owing to the use of weathered material, the flaking is apt to be a little splintery. Indented and stemmed forms occur, but these appear to be scarce. I have one winged or uni-barbed specimen, and I have seen others in other collections. The stemmed-and-barbed type is more abundant than either of the last-named forms. The very best work seen in the series has been put into these forms. When found perfect they are beautifully symmetrical, although they are not as a rule particularly thin. The largest and best that I have measures 27 × 25 × 4 mm., the stem being 8·2 mm. in length. (Plate XV.)

Pygmies.—I have not yet obtained a very extensive series of these forms. Most of them seem to come into the long narrow scalene group. In some the obtuse angle of the thicker side is reduced to a curve. (Plate XV, Figs. 27–28.)

Hammer-stones.—Small flints that have been used as hammers are not infrequent, but no definitely formed hammers or pounders have been found. I have one pebble of hard grit measuring 90 × 75 × 54 mm., which is slightly abraded at both ends; it has evidently been used as a hammer-stone. I have also a good example of a fabricator measuring 72 × 23 × 10 mm.

Axes.—The material that I have so far been able to obtain is not sufficient to enable any general conclusions to be drawn in reference to the usual forms of these implements. (Plate XVII, Fig. 7.)

The practice of re-working blunted or broken polished stone axe-blades for the production of flakes, scrapers, hammer-stones, and the like, was very extensively followed in prehistoric times.

Broken pieces of polished axes, or flakes made from them, are not uncommon in the early series of East Essex. This is important, so far as it goes, as it proves the common use of the polished axe blade at this time. In my own collection I

have only one perfect example[1] of the polished axe that even probably belongs to the Early Series. This was not found in place in the Rainwash, but on a mixed site where both series had been washed out together by the sea, and one only has the mineral condition to rely upon. The axe in question is formed from a tabular piece of flint, it has an expanded cutting edge, and slightly squared sides. (*Essex Naturalist*, vol. xvi, 1907, Plate VI, Fig. 4.) (Plate XVIII, Fig. 1.)

I have also a large rudely chipped adze-blade, of a form that is very familiar among the implements dredged from the bed of the River Thames. This I found on the surface at the top of the cliff at Frinton-on-Sea, associated with a group of prehistoric remains, including pottery, of the usual Early Series type. It may therefore be referred, with considerable show of probability, to this group. Certainly it is sharply distinguished from the Later Series, both in technique and in the material of which it is made. (Plate XIII, Fig. 1.)

Rude implements.—These are always small. They are very difficult to divide from the cores. Almost the only recognizable type among them is a small sub-triangular form. One of those in my collection measures 45 × 35 × 15 mm. This is a very typical example. I have found none of this form showing anything but rude work. None of this form have been found among the Later Series. (Plate XIII, Figs. 2–3.)

Pottery.—I have not yet succeeded in obtaining anything but small fragments. Of these pieces I have some sixty or eighty, none of which are sufficiently large to indicate the original form of the vessel. It is fairly uniform in texture, being coarse, rather soft, but not extremely so, and with much crushed flint in its composition. It is usually brown to red-brown in colour. I have found one or two pieces of the No. 2 quality,[2] which appeared to be in the Rainwash, although on this point I feel some doubt. The No. 2 quality is thicker and softer and without the crushed flint in its composition. I do not yet feel quite satisfied about this type of pottery belonging to the Early Series, as it is certainly exceptional.

Pot-boilers.—Stones calcined by the action of fire are extremely abundant. Many of these are of flint, but a quite considerable proportion of them are formed of various grits, or even of quartz. It is impossible that the comparatively large proportion of grits can be accidental. These stones, being locally rare, must have been collected purposely, and at considerable labour and trouble. No doubt it was found by experience that they stood the fire better. This is to my mind one of the strongest points in favour of these calcined stones being genuine pot-boilers.

I have recently made some experiments in boiling a pail of water by means of flints heated in a bonfire. I found that there was not the slightest difficulty in keeping the water boiling vigorously for any length of time, by occasionally dropping in a fresh hot stone, and removing one or two of those which had become cooled. Some of the stones I allowed to cool slowly, and did not drop them into

[1] I have recently obtained a second—this is shown in Pl. XVII, Fig. 7.

[2] The definition of these qualities will be given in the description of the pottery of the Later Series.

the water. These showed the same reticulated cracks, and the same calcination, as those which had been used as pot-boilers. Upon comparing the two together, I could not find any obvious difference between the genuine pot-boiler and the merely burnt flint. It is the fire, and not the water, that effects the calcination.

Thus the discovery of a calcined flint only proves the former presence of fire; it does not necessarily indicate that the calcined flint was dropped into water while hot. This may have been so, but we cannot be certain that it was. In arriving at a reasonable judgment, we must be guided largely by the probabilities of the case.

THE LATER SERIES OF IMPLEMENTS OF EAST ESSEX.

Material.—Although some weathered local flint was brought into requisition, the greater number of the implements of this series were undoubtedly made from fresh flint, obtained straight from the chalk. The outer crust of the flints is frequently remarkably fresh, and has never been weathered at any time down to the present day. Not infrequently the flints, though scarcely weathered, bear unmistakable evidence of having been rolled on a sea beach before they were worked by man. They are just such as one may pick up to-day at the foot of the chalk cliffs of Kent. Occasionally the green-coated flints from the base of the Thanet Sand have been used. These assume a peculiar brown banding beneath the crust which is always recognizable. I have frequently found these same flints used on prehistoric sites in Kent.

Mineral condition.—When first obtained from the buried surface the implements have a dull surface and are remarkably fresh and keen-edged. In fact, as has already been said, they are precisely as they left the hands of their users. They are generally more or less peat-stained, and usually have a brownish or almost chocolate-coloured tinge. When they are washed out by the sea and exposed upon the present shore, they rapidly become lustrous, and appear to assume an increased blackness, almost the blackness of jet. Upon more prolonged exposure they may become mottled with white, especially upon their abraded edges.

Cores.—These are more shapely and show much more parallel work than the cores of the Earlier Series. A large number of them are worked systematically in two definite directions; the first surface from which the flakes were removed generally forming the striking plane for the next flaking. Many of them are small, some being under 30 mm. in length. Double-ended cores are extremely rare. Many tend to be pyramidal in shape rather than prismatic.

Flakes.—These vary from pygmy dimensions to long broad blades. Many of these flakes are beautiful examples of the flint-worker's art. In spite of their simplicity they form the most perfect cutting instruments which could well be devised within the limitations of the material. The cone of percussion is not strong.

Flaking angle.—It is not, however, until the flaking angles of the cores and flakes are actually measured that the difference in technique between the Earlier and the Later Series is appreciated. Of the measurements that I have taken, the lowest

is 68° and the highest 106°, the greater majority falling between 84° and 90°. The average of all is about 87°. Many of the flakes are slightly incurved, so that they start at an angle of considerably over 90°. The diagram, Fig. 2, will make this clear. The striking plane is shown at AB, while the flaking surface is BCD. It will be seen that the angle ABC is greater than a right angle, while the average angle of the flake ABD is somewhat less than a right angle. It is not an easy operation to strike a flake such as this. There is a strong tendency merely to splinter off the corner, the fracture coming out at about the point C: it is very difficult to make the fracture follow the dotted line. In order not to exaggerate the flaking angle of this series I have measured the angle ABD, not the angle ABC. If the latter were taken, the above values would be slightly increased.

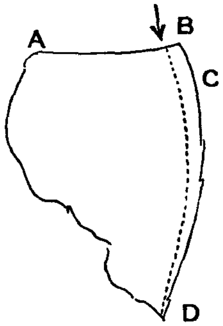


FIG. 2.

I am not suggesting that the flaking angle of local groups can be taken generally as an index of relative age. Some local groups belonging to the Late Palæolithic age show a higher skill than others which belong to the Surface Series. I am merely dealing with the facts of the case in this particular locality. How far the results may, or may not, be applicable elsewhere, must be left to future consideration.

Scrapers.—The usual horse-shoe forms are very abundant. They do not differ much from South Down work. Extremely well made examples are sometimes found, but these are rare: a large number of the scrapers are somewhat rough. Eliminating the few exceptionally good specimens, these instruments hardly compare favourably with the flakes. Other forms, such as the spoon-shaped, kite-shaped, double scrapers, and those with an elliptical curve, are occasionally found, but are comparatively rare. In this the site is quite a normal or average one. I have several examples of a type that is more unusual, and have seen others that are not in my collection. These have low-angle surface flaking on the inner face; this is often carried halfway across the instrument along one side. Some of this form are figured in the *Essex Naturalist*, vol. xvi, 1907, Plate V, Figs. 2 and 4 (Plate XIII, Figs. 6–10).

Hollow scrapers.—These are peculiarly scarce. I have no good example in my possession.

Drills.—These instruments are occasionally found, but there is nothing which calls for special remark.

Trimmed flake series.—I have found a few flakes with trimmed side-edges, but they are not abundant in individuals or notable in form. I have not found any examples of the semicircular or rectangular reaping-blades, that were set as an armature to the sickle. I have one flake with minutely serrated edges, to which reference will be made under the heading of "Special Sites." Rough flakes with a few large secondary chips boldly struck from them, such as are abundant on some sites, are not often found here.

Knives.—I have not yet seen any specimen of the Ulu or Picts' knife forms. I was, however, fortunate in discovering a very fine example of the long, curved

knife. There are also several fragments of the same type in my own and in other collections. Besides these, there are several large, leaf-shaped knives in the collection of Mr. J. Hassall. These are shown in Plate XIV which accompanies the present paper.

Many of the specimens belonging to this group form very beautiful illustrations of the flintworker's art. There are also small lancet-knives of about the size of arrow-points (Plate XVI, Fig. 16).

Spear-points.—There are a certain number of examples belonging to this group, but when compared with the number of axes and arrow-points they are comparatively scarce. There are, however, a good many pointed flakes with a tang at the butt-end. The tang being produced by longitudinal flaking from the butt end, probably before the flake was removed from the core, and not by the finer transverse secondary chipping executed from the edge. The specimen shown in Plate XVI, Fig. 17, is a case in point, but from their small size many of these may more probably be arrow- than spear-points.

Arrow-points.—These occur in considerable variety and are often of great beauty. The most delicate and regular work is generally found on the leaf-shaped forms, which are often very thin. The barbed forms are relatively less numerous than the leaf-shaped. In the Earlier Series, on the other hand, the reverse is the case, and the best work may generally be found on the barbed points. I have found no parallel in the Earlier Series to the exquisite work of the thin leaf-shaped arrow-points of the Later Series. Among the Later Series are occasional aberrant forms, such as the uni-barbed or the broad scalene, but triangular forms are very rare (Plate XVI).

Among specimens resembling arrow-points in shape, the rude rhomboidal forms shown in Figs. 22, 23, and 24 of Plate XVI are very interesting.

Reference must also be made to the types, found in both the Earlier and the Later Series, that are shown in Figs. 20, 21, and 22 of Plate XVI, and Fig. 21 of Plate XV. These are explained in the description of the plates.

Pygmy implements.—The most characteristic types among this group are the narrow scalene and the slender acicular forms. The use of these forms has given rise to much discussion, and is still far from clear. In my opinion the smaller pygmies were probably the barbs or armature of hunting and fishing implements. In the British Museum there are some harpoon-heads from Denmark made of antler and armed with a series of sharp splinters of flint. This, I think, gives some suggestion of the method in which such minute objects were used. The larger scalene forms may have been arrow-points: this view is held by Mr. F. N. Haward (Plate XVI, Figs. 26–32).

Hammer-stones.—These are usually made of flint. The most remarkable example that I have is made out of a beautifully polished axe-blade.

Axes.—These occur in considerable variety, both of igneous rock and of chipped and polished flint. Many typical examples are shown in the plates, so it is, perhaps, unnecessary to dwell further upon them here (Plates XI, XII, and XIII).

Perforated hammers.—These are most commonly, perhaps always, of the adze form like that illustrated in Fig. 122 of Evan's *Ancient Stone Implements.* That is to say, the shaft-hole is bored through the thinnest way of the blade, so that the cutting-edge comes at right angles to the shaft. The shaft-hole itself is also bored in the most primitive manner. That is to say, it is the intersection of two cones bored from either surface (Plate XI, Fig. 1).

This fact is of some importance, as the adze-hammer is, generally speaking, far more scarce than the axe-hammer. It therefore appears probable that the perforated adze-hammer, especially as it was the easier to make, is the earlier form, and is to be dated at about s.d. 50–58.

Rude implements.—As upon most prehistoric sites, rude wasters are frequently found among the more perfect specimens. The rude series of many sites, however, are obviously not mere wasters. When a number of these are placed together, it becomes apparent that their makers were working for the production of a certain series of forms, which, although rude, are yet perfectly definite. In the series with which we are dealing, there are a good many rude ovate or discoidal forms. Apart from these, I have not been able to trace any other definite idea upon which their makers were working. I think that the majority of these rude forms are nothing but mere wasters. Some examples of the ovate and discoidal forms are shown in Plate XII.

Nothing resembling the rude forms of Grime's Graves or of the South Downs is found in this series.

Pot-boilers.—Burnt natural flints and burnt flint implements are common, especially on the sites of hearths. Yet in all my years of searching I have never found a single specimen of calcined flint belonging to this series which I could, with any probability, consider to be a pot-boiler. In this it contrasts very remarkably with the Earlier Series.

Pottery.—So far as my experience goes at present—and I have now obtained a considerable amount of pottery material—the particular kind of ware which has been described as characteristic of the Earlier Series is absent from the Later. It will be remembered that Pitt-Rivers in 1898 divided early British pottery into several classes of which those that concern us here are[1] :—

"1. COARSE BRITISH.—This contains large fragments of flint, shell, or chalk in its composition, but no sand. Most of the cinerary urns are made of this quality. It is generally badly baked and hand-made; frequently ornamented.

"2. SOFT BRITISH.—This much resembles No. 1, but has no grains in its composition. It is badly baked, and frequently red on the outside and black on the inside, or in the interior of the substance. It cannot always be distinguished from No. 1, as parts of the vessels of

[1] Pitt-Rivers, "Excavations in Cranborne Chase," vol. iv, 1898, p. 13.

No. 1 quality have fewer grains than others. It is always hand-made.

"3. FINE BRITISH.—This is generally thinner than the preceding qualities; red, and without large grains of flint or quartz or sand. It is often ornamented with incised lines, and is the quality of which the so-called drinking vessels, found with crouched interments of the Bronze age, are composed. It is hand-made."

I think, for distinction, the pottery of the Earlier Series, which has been described when treating of that group, might well be defined as quality No. 1*a*. A certain proportion of the pottery of the Later Series comes within the first class. But this differs considerably from the No. 1*a*, and might be defined as quality No. 1*b*. It is generally softer than the No. 1*a*, but differs chiefly in its colour. It is always dark-coloured, and usually black or nearly so, and it contains a very large proportion of coarsely crushed flint in its composition.

Most of the pottery of this series belongs to the No. 2 quality. It is, however, not black, but brown or even light brown in colour throughout. Its surface is very frequently covered with finger-nail impressions. No perfect vessel has yet been discovered, and in the pieces so far procured the finger-nail impressions do not appear to form any obvious pattern. Some examples are illustrated in Plate XVII.

Besides these, I have also obtained some pieces of the No. 3 quality, that is to say, of the drinking cup or beaker material. This has the usual elaborate system of ornamentation, formed of incised lines placed in horizontal zones. This pottery is particularly important as it gives a clue to the date of the series.[1] Some examples are illustrated in Plate XVII. There is also one fragment of the richly ornamented form of rim, like that of West Kennet, to which reference was made in the Introduction. As there stated, this form occurs with Bronze age remains. It has been found in direct association with the beaker at Mortlake, and elsewhere,[2] while it was also associated with beaker remains in the Long Barrow of West Kennet itself.[3]

CONCLUSIONS AS TO THE AGE OF THE TWO SERIES OF IMPLEMENTS OF EASTERN ESSEX.

If the Sequence Date scale be consulted, I think it will be found that the two series of remains of Eastern Essex fall inevitably into their place in the scale, so far as this can be defined. Whether either, or both, of these series should

[1] Hon. J. Abercromby, "The Oldest Bronze Age Ceramic Type in Britain," *Journ. Anthrop. Inst.*, vol. xxxii, 1902, p. 375. "A Proposed Chronological Arrangement of the Drinking Cup," etc., *Proc. Soc. Antiq., Scotland*, vol. xxxviii, 1904, p. 323.

[2] G. Wyman Abbott and Reginald A. Smith, "Prehistoric Pits at Peterborough and The Development of Neolithic Pottery," *Archæologia*, vol. lxii, 1910, p. 333.

[3] *Catalogue of the Museum of the Wiltshire Archæological Association at Devizes*, 1911, p. 23.

be named "Neolithic," or "Bronze age," is a question depending upon the system of classification or nomenclature which may be adopted. But if we take certain fixed lines, as reference "dates," and then place other archæological units, such as the "Beaker," the custom of cremation, and the like,[1] into their relative position with regard to these fixed lines. And if we then check one unit against another by the evidence of contemporary occurrence, it is possible to obtain a scale which represents more truly and adequately the actual course of events than is the case with a system of fixed periods.

With regard to the Later Series, that is to say, the remains found upon the "Lyonesse" surface, we have first of all advanced forms of flint working. This includes beautifully polished axe heads, barbed and leaf-shaped arrow-heads, the latter often very thin, and long, curved knives. Whatever may be thought of the ruder groups of the Surface Series, such as those of Cissbury, there can be no question that this industry is paralleled by the flint work found associated with bronze in the Round Barrows. This conclusion is fully borne out by the pottery, which includes fragments of the beaker, or drinking cup, a ceramic type belonging to the early part of the Bronze age, as usually understood in this country. Upon the Continent the beaker is classed as Neolithic, as the boundary between the two periods is there drawn at a higher level. No bronze has, however, been found upon the buried surface in Eastern Essex, so far as I am aware. Unless some chemical constituent in the soil has caused its destruction, the discovery of bronze may be anticipated.

In Torbay, in Devonshire, upon a site that I believe to belong to the same "Lyonesse" surface, the hearths where primitive bronze smelting has been carried on have been discovered.[2] This is a valuable piece of evidence.

Upon the ancient surface of Eastern Essex we have contracted burial by inhumation. I have also obtained evidence which seems to me to suggest that cremation was likewise practised. One must not omit the physical evidence of the geological position of the buried surface, as being indicative of considerable antiquity.

Although reasons have been given for concluding that the remains on the buried surface do not cover a very prolonged period, yet this may extend to six or eight points of the scale. It was abandoned as an inhabited site by the submergence of the area, so if the date of the latest of the remains upon the surface can be fixed, this will also show the date of the submergence.

Taking the data which have been detailed above, it appears that the time of the submergence must have been at, or about, s.d. 58. None of the remains being very early, we may take the range of the prehistoric remains upon the "Lyonesse" surface as between s.d. 50 and s.d. 58.

[1] I have not mentioned in the table all the units dealt with by the Hon. J. Abercromby (*Proc. Soc. Antiq., Scotland*, vol. xxxviii, 1904, p. 323), but have confined myself to those that are helpful in elucidating the immediate problem in hand.

[2] D. Pidgeon, *Quart. Journ. Geol. Soc.*, vol. xli, 1885, p. 9.

The place which the Earlier Series should occupy in the scale is more difficult to fix. Their geological position shows them to be earlier, the pottery is somewhat more primitive, but the flint industry, although it differs in some respects from that of the Later Series, is by no means crude. Barbed arrow-points, showing much skill in their fabrication, are by no means uncommon. They are thus probably somewhat earlier than s.d. 50, but how much earlier is uncertain. They may be placed provisionally as s.d. 40 to 50.

I now come to consider the question whether it is possible to give any reasonably approximate estimate of the actual date of the "Lyonesse" surface, and of the remains found upon it. Can we, from the foregoing definition of its "Sequence Date," make a useful estimate of its actual age?

The dating of prehistoric remains is always a matter of great difficulty and uncertainty. It can only be accomplished with any measure of probability by bringing the local scale, through the association of antiquities of known date, into line with the histories of the more advanced countries of the Mediterranean area.

There is, however, a possibility of error in this method. It is well known that the work of a more advanced civilization may remain in the possession of a barbarous race for centuries after the date of its manufacture. Obsolete European armour or weapons may be found in [apparent] contemporary association with modern barbarous productions. If, in the future, the latter were dated by the former, a considerable error would result.

However, even this evidence is not available to us in the problem that we have in hand. The most that we can do is to compare the corresponding lithic and metallic stages of culture in the two areas. Reasons have already been given for concluding that these corresponding stages, in, for instance, England and Egypt respectively, may not have differed greatly in age. It may even be that it is England rather than Egypt that has some slight advantage in the early working of bronze.

It is generally admitted that the Phœnician traders obtained tin from these Islands. But it is certain that they never colonized or settled in the country to work the tin for themselves. Therefore, it appears, from this consideration also, that the early inhabitants of Britain discovered and worked the tin for themselves. It was the unlikely thing, of the barbarous country supplying the civilized country, which really happened, and not, as we should have imagined, the reverse of this.

I venture to think, therefore, that it is not without a certain value, although exact synchronism is not to be expected, to take the date of the corresponding culture stage in Egypt (so far as the working of stone and metal defines "culture"), to give us some approximate clue to the age of our own prehistoric remains. If the table of Sequence Dates be again referred to, and the line of s.d. [9] 58 carried across to the column under the heading of Egypt, it will be seen that it there falls between the dates of B.C. 4000 and (possibly) of about B.C. 2500.

The age of our "Lyonesse" surface may extend over a period of one or two thousand years, although the absence of weathering upon the flint implements

suggests a shorter period. From this cause alone it is not possible to attempt to give an exact date to any remains found upon this surface. But I think we may fairly take it that its age falls somewhere near the limits suggested by a comparison with the Egyptian chronology.

Special Sites upon the Buried Prehistoric Surface.

Chief among these are certain accumulations of waste material, of which I have found several presenting identical characters. These accumulations seem, so far as I have yet observed, to be about twenty yards, more or less, in diameter, and not usually more than six or nine inches in thickness. Wood charcoal is disseminated through the mass in considerable quantity. The material is also rich in the remains of broken pottery. It is upon these sites that a considerable part of the pottery, including the beaker material, has been obtained. Besides the well-formed pottery there is also a large quantity of burnt clay, bright red in colour, in rounded lumps. These are commonly about 40 or 50 mm. in diameter, but some are not more than 12 or 15 mm. Some of these are somewhat irregular in form, but many are so approximately spherical as to suggest that they may have been shaped designedly. They appear to be always present in great numbers, and to form an essential part of the accumulations. In addition to the foregoing, there is also a large amount of brown pottery, and red burnt clay, disseminated through the mass in smaller fragments

Worked flints are also very abundant. A large number of these are mere waste chips, or small pieces of flint with a few chips struck from them, probably to enable them to be used for some temporary purpose. Well-formed flakes are usually absent. Diminutive scraping tools occur in great numbers, and occasionally a small but well-formed horse-shoe scraper is found. The diminutive scraping tools owe their bevelled edge to the effects of scraping some hard (and probably rough) surface, rather than to designed secondary chipping. In size, some of them do not exceed 15 × 9 mm., while but few are larger than 37 × 26 mm., a frequent size is about 30 × 20 mm. I have not found these little tools anywhere but on these special sites, where they are extremely abundant. I have only found two other flint implements of interest upon these sites. One is a long flake measuring 79 × 24 × 19 mm. This is greatly splintered and worn along both side edges and round its narrow end through scraping some hard substance. The primary surfaces of this flake are mottled, and show evidences of some weathering, but the splintered edges are entirely unweathered, like the rest of the flints on the site. The flake had not received any modern weathering, as I dug it out from undisturbed material. It thus appears that it was an older flake which these men found and used—a not uncommon occurrence on prehistoric sites.

The other interesting flake is smaller, being 43 × 15 × 4·6 mm. It is a ridged flake, but not very thick, and has both its side edges minutely serrated. The teeth are less than one millimetre apart; there are about 30 teeth to 25 mm. It

is always difficult to be sure that serrations in flake-edges were originally designed as such. In this instance many of the teeth are broken, but in spite of this they seem too regular and too distinctly notched, to be due to accident.

There is thus much in these sites to suggest that they represent the waste product of some special industry.

Beneath one of these accumulations, and so far as I was able to judge (a considerable part of it having been washed away by the sea), approximately in its centre, was the contracted interment presently to be described. In a position that was almost certainly beneath another of these accumulations, although the immediately overlying portion had again been carried away by the sea, I also found what appeared to be the remains of a burial by cremation. This consisted of a number of pieces of pottery, buried beneath the prehistoric surface and carefully placed into the form of a perfect vessel. The bottom of this sham urn, if one may so describe it, was formed by a piece of the side, with the rim, of a large vessel. In the interior were burnt flints, and other evidences of fire. No remains of bone could be traced, but at the same time, it had certainly been buried at considerable trouble, and with much care in building up the form with broken pieces, and this would not have been done without some definite purpose. This specimen is illustrated in Plate XVII, Fig. 8.

PREHISTORIC INTERMENT NEAR WALTON-ON-NAZE.

In a communication made to the Essex Field Club, I have given an account of the circumstances that led to the discovery of this interment, of the difficulties encountered in unearthing the remains, and of the method of treatment adopted for the preservation of the bones. I need only give here the main facts of geological and archæological importance connected with it.

The position in which it was found is indicated in the diagrammatic section (page 122) at the point marked *s*. That is to say, it was found a little below the outcrop of the Buried Prehistoric Surface. The low cliff of tidal silt, about 8 to 10 feet in height, is being rapidly cut back by the erosion of the sea. These human remains have, therefore, until a few years ago, been preserved in soft clay at a depth of about 10 feet from the surface. In consequence of this fortunate circumstance their condition is remarkably good.

The grave was dug originally to a depth of about 2 feet or 2 feet 6 inches from the Prehistoric Surface. It was of only just sufficient size to contain the body in its contracted position. The skeleton lay upon its left side, with the head pointing towards the north and the face to the east. The arms were folded with the hands drawn up before the face. The right leg was flexed in the usual manner of contracted interments. The left leg, which was the under one as the body lay, was also folded to the body, but kept straight at the knee, so that the left foot was in front of the face. This leg was also inclined upwards as the body lay in the grave, so that at the time of its discovery the left tibia and fibula were standing obliquely out of the clay, considerably above the level of the skull. It was the fact of the

tibia and fibula thus standing out of the clay that led to the discovery of the skeleton. The left foot had been washed away by the sea, and no trace of it was found.

The anatomical examination undertaken by Professor Arthur Keith has not revealed any cause for the unusual straight position of this leg. The left knee-joint appears perfectly normal.

The body had been wrapped round with the tough roots of one of the sand-grasses, which had not improbably been used as a binding to keep the body in its contracted position.

The cavity of the stomach and intestines, that is to say, the position that they occupy in the body, contained a considerable quantity of seeds, amounting to at least a pint, or probably more. This was not actually measured, its quantity was only estimated. I merely brought samples away for examination. The peculiar difficulties encountered in the work prevented any attempt being made to recover it all.

These samples I submitted to Mr. Clement Reid, F.R.S., who pronounced the majority to belong to the blackberry, together with a smaller proportion of dog-rose and *Atriplex*. This was undoubtedly the remains of food which the man had eaten.

In the decayed grass which was found swathing the bones, I looked carefully for any evidence of this having been woven into any kind of fabric. But this did not appear to have been the case.

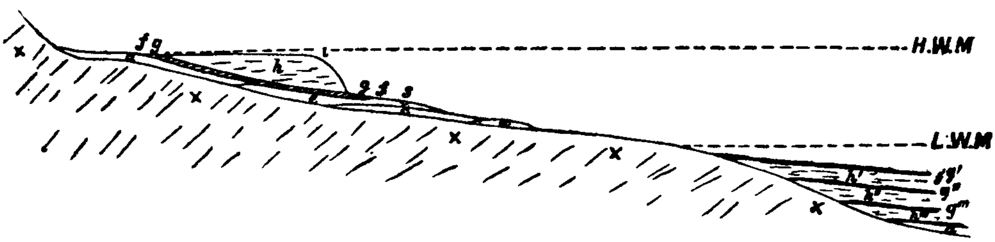
No archæological relics were found within the grave. But it must be remembered that the grave was only just large enough to hold the body. If any funeral furniture had been placed above the body it would have been removed by the sea before its discovery.

The Prehistoric Surface above, within a radius of a few yards of the site of the interment, has yielded a considerable quantity of debris. I have been watching this for some years, as the sea has gradually cut back the outcrop of the ancient surface. It was in returning to this well-known site in September, 1910, that I discovered the interment. The remains found here consist of worked flints, broken pottery, and rounded lumps of burnt clay, the whole mixed with much wood charcoal.

The general character of these remains has already been described under the heading of *Special Sites*. This particular site, although full of crushed débris, has not yielded nearly so much in good condition as others which are precisely similar. The pottery from here does not include any remains of the "Beaker." This, however, considering the comparatively small amount of recognizable material which has been obtained, is only what might be expected. The remains are in every other respect identical, and their geological position proves all these sites to be of the same age.

The skeleton was disinterred entirely by myself, with the able assistance only of my friend, Mr. Miller Christy. We did not obtain any outside labour. We endeavoured to observe every point which seemed to be of any interest.

In conclusion, it only remains for me to express my thanks to many archæologists who have so generously placed their collections at my disposal. In particular, I would mention Dr. Henry Laver, F.S.A., Mr. F. N. Haward, and Mr. J. Hassall, many of whose specimens have been used in illustration of the present paper.



DIAGRAMMATIC SECTION SHOWING THE GENERAL RELATIONS OF THE RECENT DEPOSITS OF EAST ESSEX.

(*i*) Present salting surface, terminating in a low cliff. The horizontal extent of this surface is much reduced in the diagram. The low cliff is being cut back by the sea. (*h*) Tidal silt. (*g*) Peat. (*f*) Buried Prehistoric surface beneath the peat. (*e*) Marsh clay. (*d*) Brickearth with implements of polished stone. (*c*) Pleistocene brickearth. (*a*) Marsh deposits with mammoth fauna. (*s*) Position of prehistoric grave beneath the buried surface; the tidal clay extended over this site until a few years since. (*f'*) (*g'*) Probable extension of buried Prehistoric surface, with associated peat, beneath low tide level. (*g''*) (*g'''*) Probable position of lower peats, such as have been found at the Barry Docks and elsewhere. (*h'*) (*h''*) (*h'''*) Intercalated beds of tidal silt. (*a'*) Probable position of Late Pleistocene marsh deposits or gravels. (*x*) London clay. *H.W.M.*, *L.W.M.* = high and low water marks.

Description of the Plates.

The scale of the photographs of the stone implements and pottery varies slightly in different instances. In many cases the actual measurements are stated. These are of the greatest length, greatest breadth, and greatest thickness, and they are given in millimetres. The weight of the smaller specimens is given in grains. The lettering to the numbers of the figures is uniform, the reverse face of the specimen being marked *a*, the edge view *b*, and the cross-section *c*.

PLATE XI.

Approximate scale ½ natural size.

Later Series.

Fig. 1.—Perforated adze-hammer. The shaft-hole, as is usual in this type, is formed by the intersection of two cones. Surface lightly picked. The hammer-end shows evidence of much use, the adze-end is also very blunt and rounded. Material, light grey-green igneous rock (diabase ?). Size, 125 × 49 × 27 mm.; shaft hole 16 mm. in diameter in the middle, and 35 mm. at the outside. Laver collection.

Fig. 2.—Adze or axe. Surface picked all over (including the bevel of the edge), and slightly smoothed. Five slight ribbings on the thickest part of the blade. Cutting edge expanded and very slightly gouge-shaped, also much smoothed and rounded. This is a copy, made in stone, of a metallic form of axe-blade. It indicates the knowledge, and the scarcity, of the copper axe. Material, dark green igneous rock. Size 210 × 96 × 50 mm. Found by Mr. F. Spalding. Laver collection.

Fig. 3.—Gouge? Surface as in fig. 2, but bevels of the edge more ground down. Edge distinctly gouge-shaped and moderately sharp. The average gouge curve of the edge has a radius of seven inches. Material, dark green igneous rock. Size, 125 × 67 × 28 mm. Found by Mr. F. Spalding. Laver collection.

Fig. 4.—Axe. Surface and material similar to the above. Cross-section oval. This is the most usual form of (non-flint) stone axe-blade of the district. Size, 146 × 58 × 43 mm. Laver collection.

Plate XII.

Approximate scale ½ natural size.

Later Series.

Fig. 1.—Axe-blade in beautifully polished flint, cutting-edge rather oblique and still keen. Deeply peat-stained. 109 × 47 × 24 mm. Warren collection.

Fig. 2.—Adze? in polished flint. Condition, black mottled with (originally) white patches having an ochreous staining superimposed upon them. Edge slightly gouge-shaped; the average gouge curve having a radius of about eight inches; the striæ of grinding of the concave bevel pass obliquely across. 122 × 57 × 33 mm. Laver collection.

Fig. 3.—Imperfect axe in polished flint, used as a core (flakes made from polished axes are not uncommon), and also subsequently for hammering. Laver collection.

Fig. 4.—Chipped axe with polished edge and slight traces of grinding elsewhere. This flint is ochreous, and it may belong to the Earlier Series. The flints in the "Lyonesse" surface are never stained, but on the other hand they sometimes become stained after being washed out of their bed. 112 × 46 × 19 mm. Laver collection.

Fig. 5.—Partially polished axe in grey flint: probably a polished axe re-chipped and then the edge re-ground. 144 × 52 × 29 mm. Found by Mr. F. Spalding. Laver collection. This specimen has almost the appearance of a forgery, but Dr. Laver assures me that it cannot be so.

Fig. 6.—Boldly worked oval blade. This specimen is not unlike a Palæolith, but it is actually made from a large polished axe, part of the outline of which is shown by the dotted lines. 100 × 84 × 21 mm. Warren collection.

Fig. 7.—Smaller oval blade, 52 × 49 × 18 mm. Warren colleetion.

Fig. 8.—Fabricator (unused), slightly rubbed down along the side edges in order to protect the hand in use. 107 × 24 × 14 mm. Hassall collection.

Early Series.

Fig. 9.—Fabricator, in weathered ochreous flint from the rainwash underlying the "Lyonesse" surface. 69 × 21 × 10 mm. Warren collection.

Plate XIII.

Approximate scale ½ natural size.

Early Series.

Fig. 1. Chipped adze of very rude workmanship, similar to these from the bed of the River Thames. Made from a green-coated flint. Found on the top of the cliff at Frinton-on-Sea associated with a group of characteristic "Early Series" types of flint implements and pottery. 208 × 67 × 57 mm. Warren collection.

Fig. 2. Rude sub-triangular form. 41 × 34 × 17 mm. Warren collection.

Fig. 3. Another similar. 47 × 36 × 18 mm. Warren collection.

Later Series.

Fig. 4. Double-ended pick (?) in black flint for binding round the middle. Rude forms such as this are rare among the Later Series. 174 × 40 × 37 mm. Laver collection.

Fig. 5. Adze of triangular section in chipped flint, the cutting edge is formed by the intersection of two transverse facets, and is much polished and striated by use. 115 × 47 × 32 mm.

Fig. 6. Scraper with notched side-edges.

Fig. 7. Horse-shoe scraper, slightly worked on the inner face (a feature sometimes seen in this series, see also *Essex Naturalist*, vol. xvi, 1908, page 50, Plate V).

Fig. 8. Horse-shoe scraper worked back along the side edges to the butt-end.

Fig. 9. Horse-shoe scraper.

Fig. 10. Horse-shoe scraper with the butt-end worked back to a point.

Fig. 11. Conical scraper, very greatly worn on its scraping edges. Much resembling a core in general form. A similar specimen from the buried surface in Lincolnshire is figured in *Man*, 1907, 89, Fig. 1. This is of the "grattoir Tarté" form. It shows that this type is not an indication of the Aurignacien period. 38 × 34 × 24 mm.

The originals of figures 5 to 11, Warren collection.

PLATE XIV.

Approximate scale ½ natural size.

Later Series.

Fig. 1. Flint knife, of leaf-shaped form. 117 × 47 × 11 mm. Hassall collection.

Fig. 2. Flint knife, of the so-called "dagger" form, but less elaborately fashioned than most of this type. 106 × 42 × 10 mm. Warren collection.

Fig. 3. Flint knife of leaf-shaped form. 144 × 42 × 11 mm. This specimen has been polished and smoothed by prolonged use on both faces along the lower half of the inside edges as shown in the two views 3 and 3*a* on the plate. Hassall collection.

Fig. 4. Curved knife, of sickle-shaped form, the side edges are smoothed by grinding. 153 × 33 × 12 mm. Warren collection.

Fig. 5. Small knife, made by low angle chipping on a naturally broken flint. 58 × 34 × 9 mm. Warren collection.

Fig. 6. Broad leaf-shaped blade, not elaborately finished. 66 × 37 × 6·7 mm. Hassall collection.

Fig. 7. "Spear-point" of similar work. 78 × 45 × 6·8 mm. This is very probably a knife, as it is "bevel-edged" near the point, that is to say, re-sharpened by higher angle chipping. This may be traced in the edge view, 7*b*. Hassall collection.

Fig. 8. Flake with high angle splintering all round the edges; this is due to wear in the use of the implement and not to designed flaking. From one of the "special sites" described in the text. 77 × 23 × 10 mm. Warren collection.

Early Series.

Fig. 9. Spear-point, made from a ridged flake with slight secondary chipping at the point, and at the butt-end to form a tang. 54 × 18 × 7 mm. Warren collection.

PLATE XV.

Approximate scale ¾ natural size.

Early Series.

Fig. 1. Barbed arrow-point.

Fig. 2. " " 27 × 25 × 4 mm. Weight 29½ grs.

Fig. 3. " "

Fig. 4. " " 19 × 22 × 3·8 mm. Weight 21 grs.

Fig. 5. " "

Fig. 6. Stemmed arrow-point.

Fig. 7. Indented arrow-point, of unusual thinness. 24 × 18 ? × 2 mm. Weight 12 grs. (imperfect).

Fig. 8. Unfinished barbed arrow-point, broken in manufacture, only one notch having been chipped out to form the stem.

Fig. 9. Leaf-shaped arrow-point of fairly broad form, not elaborately finished. 32 × 24 ? × 3 mm. Weight 31 grs.

Fig. 10. Leaf-shaped arrow-point.

Fig. 11. Leaf-shaped arrow-point, somewhat narrow and thick. This specimen was found washed out of its bed on a mixed site where both series occur; it may belong to the later series. 38 × 15 × 5 mm. Weight 37 grs.

Fig. 12. Triangular arrow-point, made from a curved flake with only partial secondary working.

Fig. 13. Indented arrow-point of similar technique. 32 × 22 × 4·2 mm.

Fig. 14. Uni-barbed arrow-point.

Fig. 15. Small knife of lancet form, very well worked and nearly flat on one face.

Fig. 16. Transverse arrow-point.

Fig. 17. Triangular arrow-point with a minimum of secondary flaking. 32 × 20 × 4·3 mm.

Fig. 18. Ditto. 27 × 23 × 3 mm.

Fig. 19. Ditto.

Fig. 20. Transverse arrow-point.

Fig. 21. The transverse arrow-points pass into forms that appear to be small tools rather than weapons: the hollow curves upon either side frequently show evidences of use. For the purpose of an arrow-point this specimen would be used the opposite way up to that in which it is shown, but in that position the butt end would be too thick to be inserted into the shaft. 29 × 34 × 6·5 mm.

Fig. 22. A less developed example of the same form; this could not be an arrow-point. The hollow curve in this series is quite different from that of the true hollow scrapers.

Fig. 23. Small side scraper.

Figs. 24 and 25. Two small side scrapers found *in situ* in the brick-earth below the "Lyonesse Surface" by Mr. F. N. Haward. These forms are characteristic of the Early Series, and it is gratifying to find that Mr. Haward has arrived independently at the same conclusion as myself.

Fig. 26. Small horse-shoe scraper.

Fig. 27. Part of a worked flake of a narrow scalene form, resembling a well-known type of pygmy implement but of exceptionally large size. Found near the axe shown in Plate XIII, Fig. 1.

Fig. 28. Pygmy implement with delicate edge working.

All except Fig. 27 (*and possibly Fig.* 11) *are from the rainwash deposit; and all except Figs.* 24 *and* 25 *are in the author's collection.*

Plate XVI.

Approximate scale ¾ natural size.

Later Series.

Barbed Arrow-points.

Fig. 1. Size 32 × 24 × 4·6 mm. Weight 41½ grs. Hassall collection.

Fig. 2. Broken and re-worked with high angle chipping along one side. 17·5 × 20 × 3·7 mm. Weight 16 grs. Hassall collection.

Fig. 3. Size 47 × 36 × 5 mm. Laver collection.

Fig. 4. Size 44 × 31 × 5·5 mm. Laver collection.

Fig. 5. Size 38 × 24 × 4·5 mm. Weight 48½ grs. Hassall collection.

Fig. 6. Size 23 × 29 × 4 mm. Weight 28 grs. Hassall collection.

Leaf Shaped Arrow-points.

Fig. 7. Size 23 × 15 × 2·5. Weight 11¾ grs. Hassall collection.

Fig. 8. Size 35·5 × 20 × 3 mm. Weight 36½ grs. Hassall collection.

Fig. 9. Size 38·5 × 23 × 2 mm. Weight 36 grs. Hassall collection.

Fig. 10. Ruder leaf-shaped blade, 35 × 27 × 4·5 mm. Weight 68 grs. It is remarkable that although the work on this is rude, it is not thicker than some of which the work is delicate and regular. Warren collection.

Fig. 11. A narrower and thicker form, 49 × 19 × 5·8 mm. Weight 80 grs. Hassall collection.

Fig. 12. Size 33 × 16 × 3 mm. Weight 24½ grs. Hassall collection.

Fig. 13. Broken in prehistoric times. Found *in situ* in the "Lyonesse" surface not far from one of the "special sites." 37 × 24 × 2·8 mm. Warren collection.

Fig. 14. Size 45 × 22 × 3 mm. Weight 53½ grs. Hassall collection.

Fig. 15. The unsymmetrical shape of this suggests that it may be a lancet-knife rather than an arrow-point. 42 × 19 × 2·7 mm. Weight 35 grs.

SMALL KNIVES AND RUDER FORMS.

Fig. 16. Lancet-knife.

Fig. 17. Flake arrow-point, with a tang at the base made by longitudinal flaking from the butt-end, and not by transverse flaking from the edges. Many of this type have been found.

Fig. 18. Broad scalene arrow-point. Warren collection.

Fig. 19. A similar form. Both of these have a minimum of secondary chipping. 39 × 24 × 5 mm. Weight 58 grs. Warren collection.

Fig. 20. Uni-barbed arrow-point. This, as is usual with this form, has a minimum of secondary flaking. 48 × 25 × 5·5 mm. Weight 73 grs. (imperfect). Hassall collection.

Fig. 21. A form similar to Fig. 21 of the previous plate. 35 × 43 × 5 mm. Weight 100 grs. Hassall collection. (There are many of this form, and belonging to the same series, in the collection of Mr. Mothersole of Chelmsford.)

Fig. 22. Rude rhomboidal form. 37 × 33 × 7 mm. Warren collection (as also the remainder on this plate).

Fig. 23. A similar form, imperfect.

Fig. 24. Another example of the same form. These may have been intended to have been more elaborately finished, but the material being of insufficiently good quality the attempt was abandoned. On the other hand, these ruder and stronger objects would be more useful for many purposes than such delicate lancet-knives as are seen in Fig. 16. 42 × 36 × 10 mm.

Fig. 25. Broken triangular spear-point, or not improbably a barbed arrow-point in the first process of manufacture.

PYGMY IMPLEMENTS.

Fig. 26. Rather large, narrow, scalene form.

Fig. 27. Narrow scalene form.

Fig. 28. " " "

Fig. 29. A rather broader example of the same.

Fig. 30. Delicate needle-like form.

Fig. 31. Another rather similar.

Fig. 32. Diminutive side-scraper.

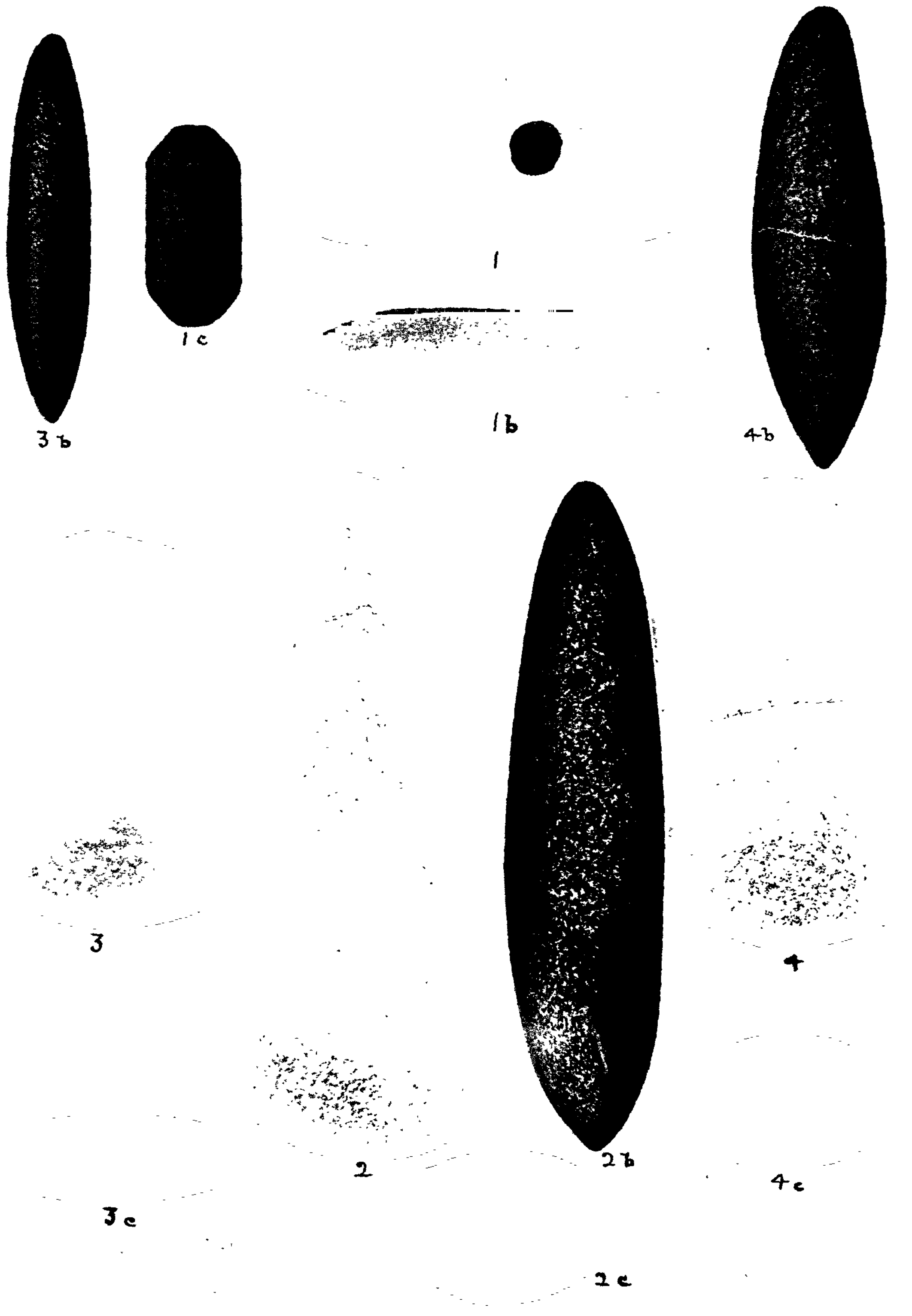
PLATE XVII.

Later Series.

Fig. 1. Portion of rim of vessel of No. 2 quality pottery, ornamented with finger-nail impressions. Thickness 11·5 mm. The diameter of the vessel at the rim was about 12 inches.

Fig. 2. Another similar specimen but thinner and smaller, diameter at the rim about 7 inches.

Fig. 3. Portion of a beaker or drinking-cup. The horizontal flutings are not formed by combing, but by the impression of series of rectangular "punch-marks." Diameter at the widest part of the vessel about 6½ inches. The technique of this agrees with



(*S. H. W. Photo.*)

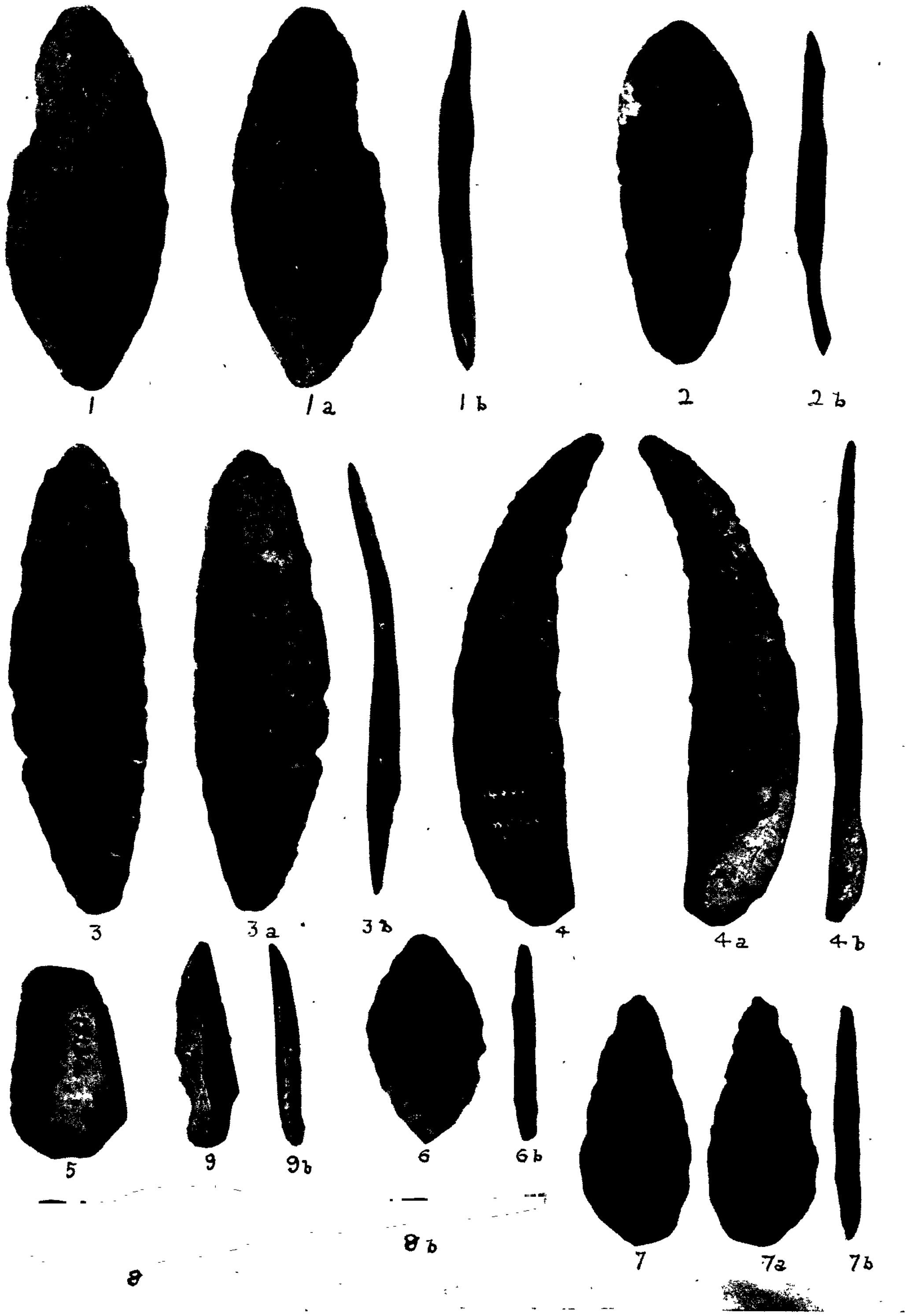
PREHISTORIC REMAINS FROM EASTERN ESSEX.

(*S. H. W. Photo.*)

PREHISTORIC REMAINS FROM EASTERN ESSEX.

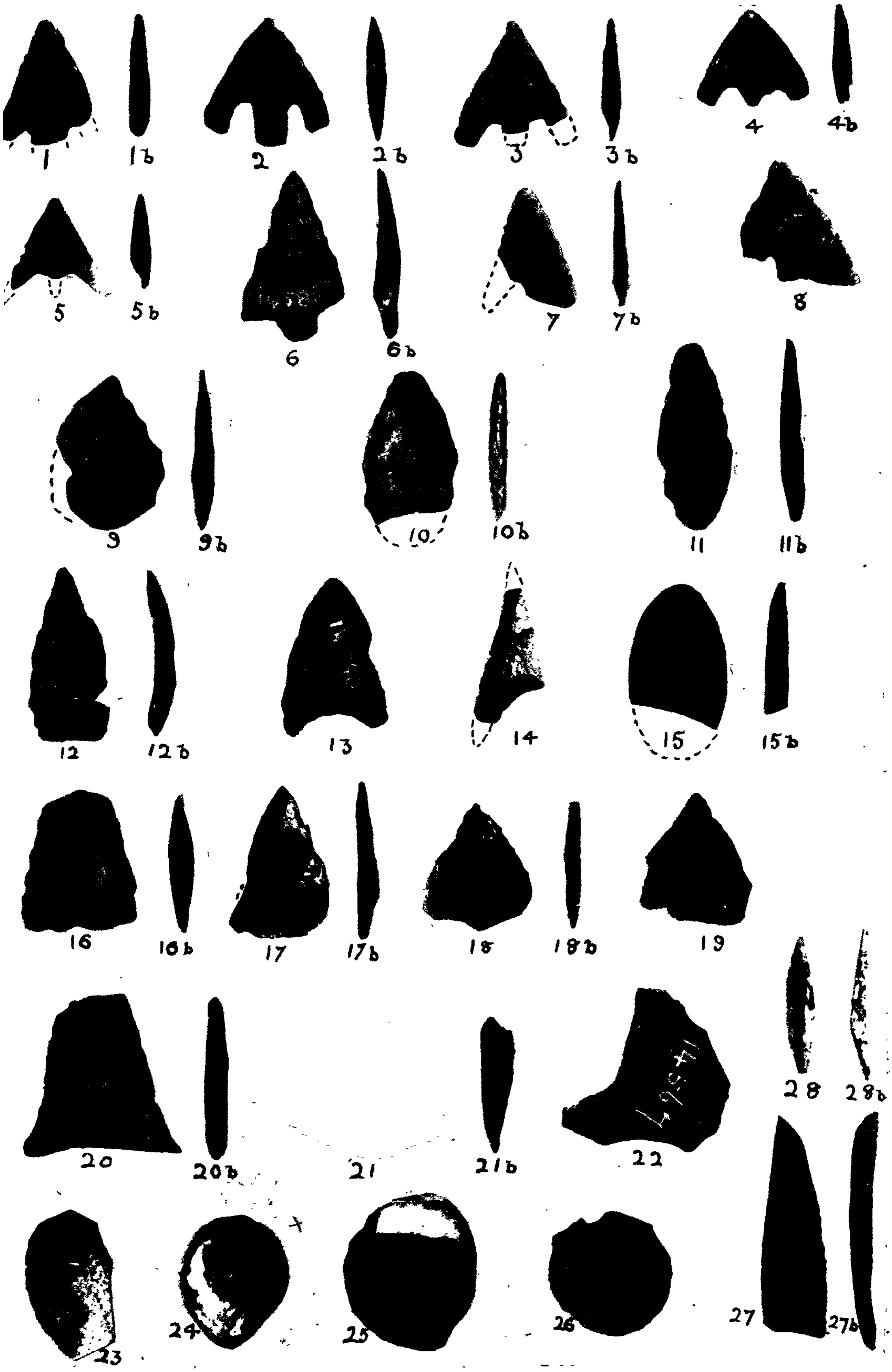
(*S. H. W. Photo.*)

PREHISTORIC REMAINS FROM EASTERN ESSEX.



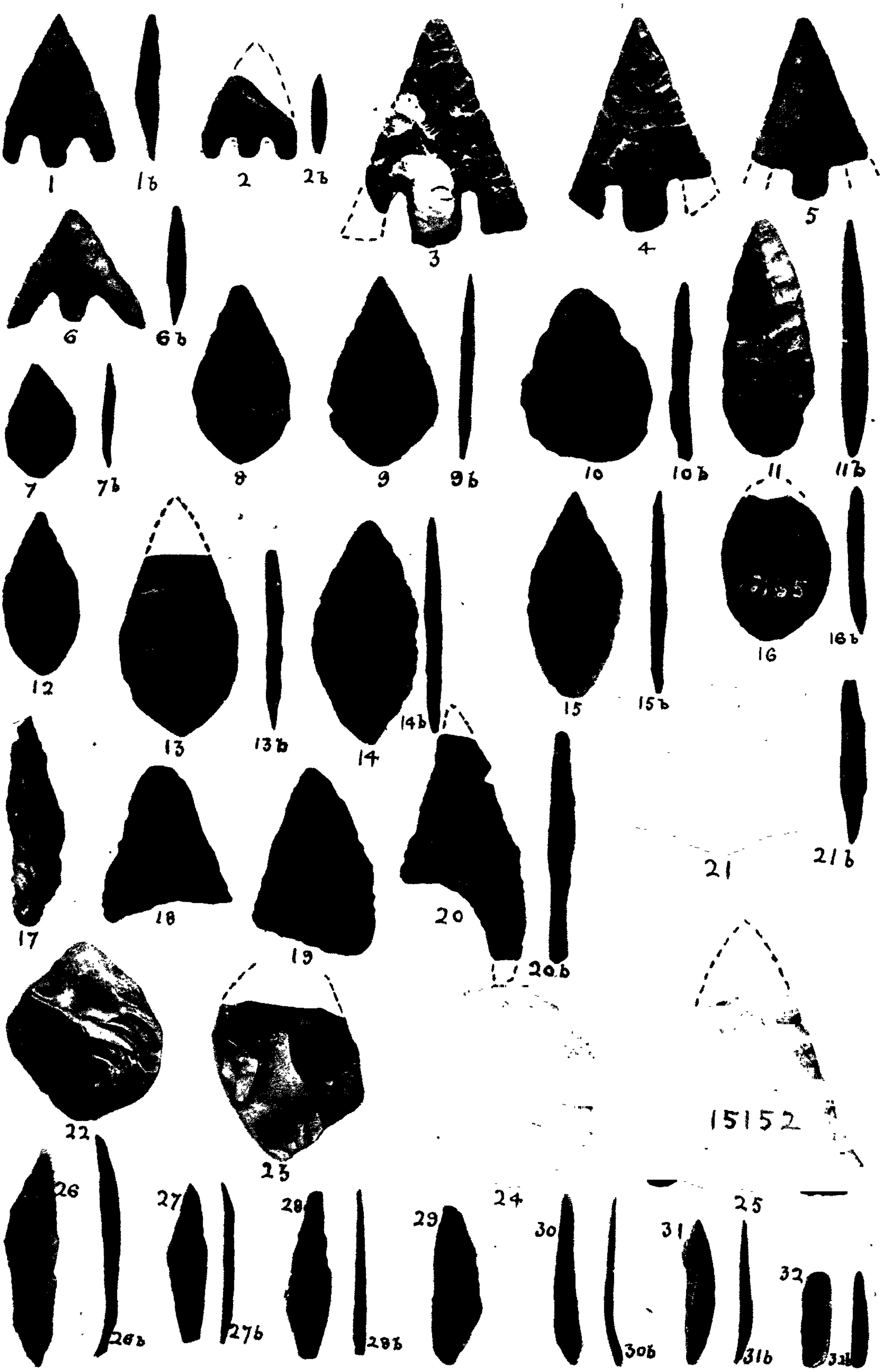
(*S. H. W. Photo.*)

PREHISTORIC REMAINS FROM EASTERN ESSEX.



(*S. H. W. Photo.*)

PREHISTORIC REMAINS FROM EASTERN ESSEX.



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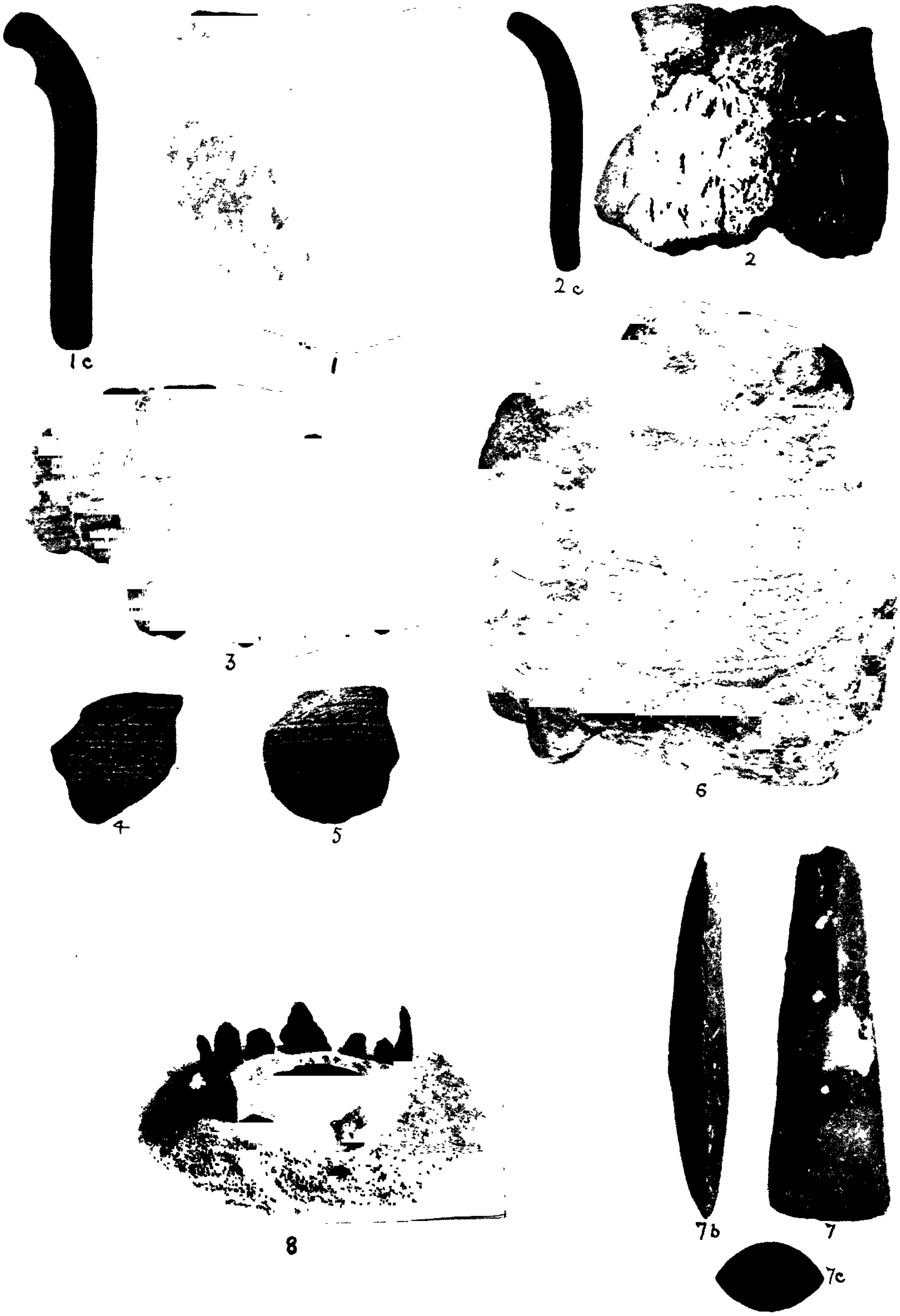
PREHISTORIC REMAINS FROM EASTERN ESSEX.



(*S. H. W. Photo.*)

PREHISTORIC REMAINS FROM EASTERN ESSEX.

FIG. 1.

FIG. 2.

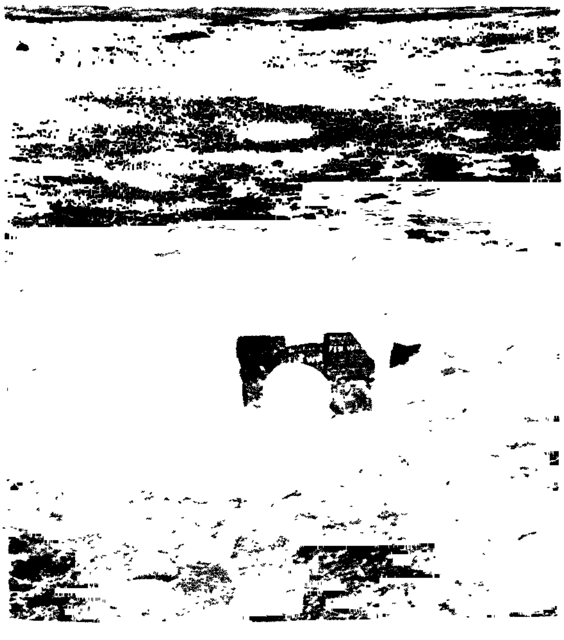


FIG. 3.

FIG. 4.

PREHISTORIC REMAINS FROM EASTERN ESSEX.

the beaker figured by Pitt-Rivers, *Excavations in Cranborne Chase*, vol. ii, Plate lxxvii.

Figs. 4 and 5. Two fragments of No. 3 quality pottery, with characteristic beaker ornamentations. The thickness of the specimens shown in Figs. 3, 4 and 5 is from 5 to 8 mm.

Fig. 6. Portion of rim of beaker, shown in original matrix. The scale of this photograph is shown by the half-circle placed on the matrix, this is one inch in diameter.

Early Series.

Fig. 7. Polished flint axe or chisel. This was found on the same site as that shown in Plate XIII, Fig. 1. The bevels of the edge are particularly well polished and the edge is still keen. This is a recent addition (January 1912), and has had to be placed rather out of its proper order in the plates. 124 x 40 x 21 mm.

Later Series.

Fig. 8. "Sham urn," made of pottery of quality No. 1b. This was replaced in sand approximately in its original position. It was about 12 inches in diameter, see description in the text, page 120.

The specimens shown in Figs. 2, 3, 4, 5 *and* 6 *were found on one of the special sites described in the text. All except Figs.* 6 *and* 8 *are approximately* ½ *natural size. All are in the author's collection.*

PLATE XVIII.

Fig. 1. Polished flint axe head made from a piece of tabular flint. Probably Early Series. Photographed as it was first seen. It has also been figured and described in the *Essex Naturalist*, vol. xvi, 1908, Plate vi, Fig. 4, and page 50.

Fig. 2. The axe-head shown in Plate XII, Fig. 1, photographed where it was found.

Fig. 3. Photograph of the prehistoric interment found near Walton-on-Naze. This was taken by Mr. Miller Christy, as soon as the bones were exposed and before they had been disturbed.

Fig. 4. The stemmed arrow-point shown in Plate XV, Fig. 6, photographed where it was found on a little patch of gravel among the salting vegetation.

REPORT ON THE SKELETON FOUND NEAR WALTON-ON-NAZE.

By Arthur Keith, M.D., Conservator of the Museum, Royal College of Surgeons, England.

An examination of this skeleton brings one face to face with the difficulties which may be encountered in the recognition of sex. When Mr. Warren brought the skeleton to me I at once said that the skull was that of a woman, but when he directed my attention to the pelvis I at once admitted my error, for the characters in it were overwhelmingly of the male caste. When alluding to the characters of this skeleton in my Hunterian lectures, I spoke of them as male, regarding the skeleton as a representative of the slim young man of short stature and delicate features a type which is plentifully represented in every branch of modern civilized life. It was only when I came to write out a full description of the skeleton that I observed that at every point, except as regards the pelvis, that I had to admit the parts were those of a young woman not those of a man. Lately I have had occasion—owing to the pelvis of an individual who had passed through life as a woman, but who was found at death to have the imperfect parts of the male, being presented to the College of the Museum by Dr. Arthur Davis—to examine more minutely than I had done before the various characters which one looked on as characteristic of the male and of the female. There can be no doubt that in the case of the pelvis, as in the case of the skull, there is a percentage of individuals—perhaps three or four per cent. as regards the pelvis—more as regards the skull—in which the sexual features are so ill marked that it is impossible to assign the sex with any degree of certainty. This appears to be the case as regards the Walton-on-Naze individual, for in skull, in proportions of the body, in the configuration of the limb, bones, and ribs, especially in the form of sternum, the characters of the typical female are shown. I am therefore compelled to regard the skeleton here described as an example of the narrow-hipped, slender woman which one can see not unfrequently in England to-day.

The Characters of the Pelvis.

One feature of women is the breadth of the pelvis and hips in comparison to the breadth of their bodies and chests. In this case, having all the vertebrae and ribs, the greatest width of the thorax, at the level of the seventh pair of ribs can be estimated; it is approximately 200 mm., the width of the pelvis from iliac crest to iliac crest is 243 mm.; the width of the pelvis as regards the width of the thorax is that of a woman. In the male the diameters are equal or the thoracic is the greater.

The main character of the woman is the size of the diameters of the true

pelvis; they should be large enough to allow an easy passage to the head of the child at birth.

One must take into consideration the upper margin of the pelvis or inlet, and the lower margin or outlet. Nothing can be inferred from the absolute diameters of the inlet; they are frequently as large in the male as in the female. In this case they are small, even for a male—the front to back diameter (conjugate) is only 85 mm. (an average male =100, average female=112); the side to side diameter (transverse) is 118 mm., in an average male it is 125 mm., in a female 131 mm. I do not think the inlet would permit the passage of the head of a normally sized child.

Although small, the transverse diameter of the inlet bears the proportion to the breadth between the iliac crests that one finds in women. The transverse diameter of the inlet is—in the typical male 45·5 per cent. of the bi-crestal diameter, and 47·5 per cent. in the typical female: in the skeleton under description it is 48·5 per cent.—a well-marked female feature.

To allow the passage of the child, the outlet of the pelvis has to be large; its transverse diameter in the typical male is 70 per cent. of the inlet; in the female 90 per cent.; in this case it is 71 per cent.—a male character.

Then, again, the female pelvis is squat and shallow; its total breadth is 126 per cent. of its total height in the male, 139 per cent. in the female; in this case it is 128—a male character. Above all this pelvis has the male feature of an extremely small sacro-sciatic notch—the size of the notch depending on the growth of the ilium to form a roomy inlet to the pelvis for the passage of the child. The width of the notch, measured from the posterior inferior iliac spine to the ischial spine is only 50 mm.—a typical female may be double this size; the depth of the notch is 32 mm. On the other hand the preauricular groove is present, and that is usually regarded as a character of the female. The sacrum is 107 mm. long by 100 wide; the proportions are distinctly those of the male.

Another feature of the typical female pelvis is seen in the sub-pubic arch, for this has to be wide to allow the passage of the child's head and its rami or boundaries are more slender and thinner than in the male, in whom these parts have to be strengthened and thickened for the attachment of the male organ. The characters of the pubic arch are rather female than male in character in the Walton-on-Naze pelvis; the pubic rami show impressions for an organ shaped as the clitoris rather than for one with the size and form of a penis; the arch is moderately wide—62 mm. wide at a distance of 45 mm. below the symphysis—not so wide as in a typical female, but wider than in a typical male. Taken altogether the pelvic characters are those of the male, and yet there are features which tend decidedly to the female form.

THE STERNUM.

The form of sternum seen here I have only observed in the body of a woman; never in that of a man. The manubrium or upper part of the sternum, is 47 mm.

long by 50 mm. wide; the body, blade, or meso-sternum, is only 66 mm. long by 26 mm. wide. In males the length of the manubrium to the blade is usually as 1 : 2, in the female as 1 : 1·6–1·8; here it is as 1 : 1·4—ultra female.

As the further description is read—the short arms, the short span, the long body, high head and short neck, the relatively short lower limbs with the middle point of the body well above the symphysis pubis—the female characters are so predominating as to convince one that this Late Neolithic or Early Bronze individual represented a condition which gynæcologists have to contend with amongst modern women.

ATTACHMENT OF SKULL TO NECK.

The slender and fine modelling of the bones are certainly female. So especially is that part of the base of the skull which gives attachment to the neck. This area, shown in the profile of the skull, Fig. 1, is shaded. In an average

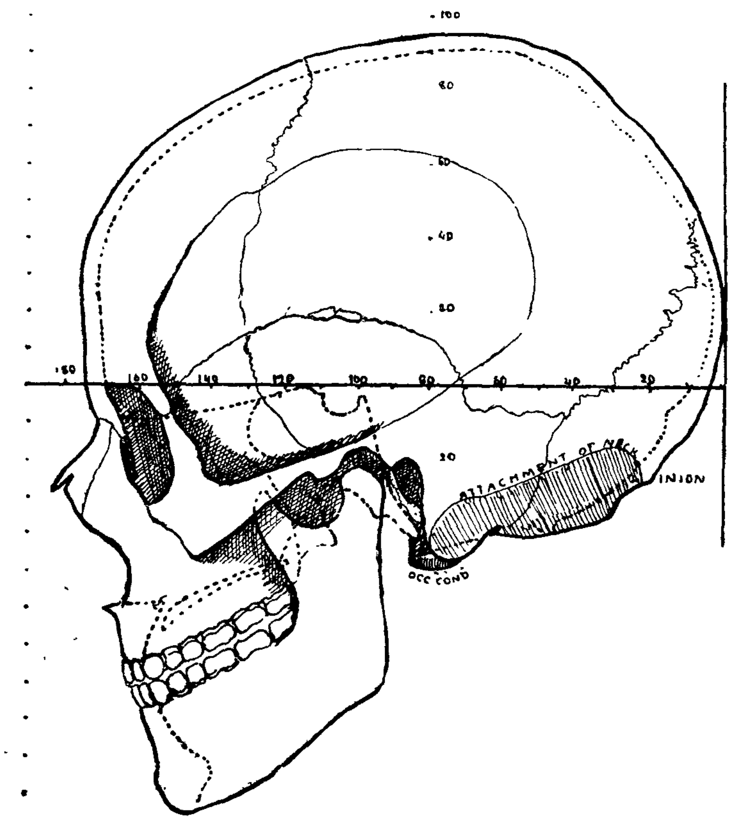


FIG. 1.—Profile of Walton-on-Naze skull (half natural size). The outline of the cranial cavity is represented by a stippled line. The skull is oriented on the sub-cerebral plane, indicated by t'a line.

Englishman this area is 80 mm. from back to front—measured in the profile of the skull from the inion or occipital protuberance to a line joining the anterior border of the mastoids; here, as in a typical woman, it is 60 mm.; the width in the

male (the bimastoid diameter) is 125–130 mm.; here it is 115 mm., a measurement usual in the female. The oval face, the characters of the forehead, the thin cranial bones, the maximum diameters of the skull, situated well above the level of the ears, all indicate the female.

AGE. STATURE.

The age is probably between twenty-five and thirty years; all the growing ends have joined the shafts of the bones; the sutures of the cranial vault are freely open on the inner and outer aspects; the bones are thin, varying from 3–4·5 mm. in thickness; the first molar is worn so as to expose the dentine on the crown of the first molar; the dentine is appearing at the tips of the cusps of the second molars, while the upper third molars are but little worn; the third lower molars begin to show dentine at the apices of the cusps.

The stature I estimate at 1629 mm. (5 feet 4 inches), and is made up as follows :—

Height of skull from condyles to—

	mm.
Highest point of vault	= 152
Cervical part of spine	= 110
Dorsal part of spine	= 285
Lumbar part of spine	= 170
Pelvic height from acetabulum to level of body of first sacral vertebra	= 60
Femur	= 420
Tibia	= 360
Astragalus and os calcis (height of foot)...	= 72
	1,629[1]

HEAD FORM.

As regards the head form, only the chief measurements are given, for it will be possible to obtain from the two accompanying drawings all details relating to the shape, size, and proportions, of the several parts. Some explanation of the drawings is necessary. In the drawing of the lateral aspect the interior as well as the exterior of the skull is represented. The skull is oriented on the sub-cerebral plane, which corresponds to the upper surface of the presphenoid in the anterior part of the skull, and to the attachment of the tentorium to the posterior inferior angles of the parietal bones in the back part of the base. In reducing the drawings to half natural size by a pantograph, a slight error has been introduced in the length of the skull (it is shown as 178 in place of 176). In the full face view the plane of orientation is the same as for the side face.

The cubic capacity of the cranial cavity is 1260 c.c.; the maximum length is 176 mm. (occipital projection to frontal eminence); the length from occiput to

[1] The internal malleolus is also included = 12 mm. This ought to be deducted.

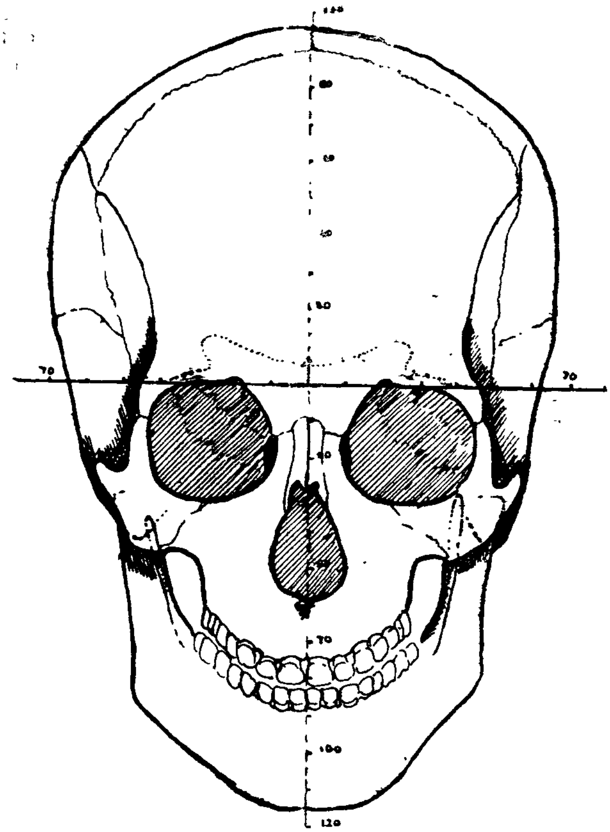
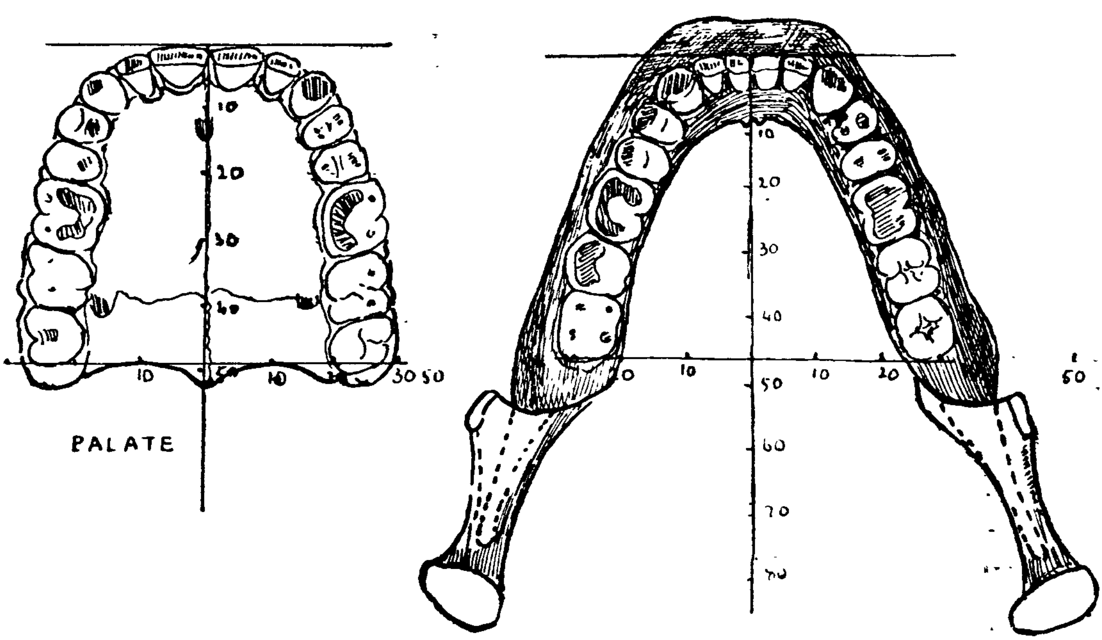


FIG. 2.—Full-face view of the Walton-on-Naze skull oriented on same plane as Fig. 1. The mastoid processes are indicated (half natural size).



FIGS. 3 AND 4.—The palate and mandible of the Walton-on-Naze skull. The degree of reduction is shown by the centimetre measurements. The mandible was oriented on the plane marked by the chewing surface of the teeth.

glabella is 173·5 mm., from inion to glabella 158 mm. The short inio-glabellar length, the much longer occipito-frontal length, are in the proportions which one expects to find in a woman's or a boy's skull, not in an adult man's. The greatest width of the skull is 137 mm., and is situated near the parieto-squamous junction; the upper parietal width is 135; the bimastoid width 115 mm. The relatively small bimastoid is a character of the female or of the boy. All these measurements are small—much below the mean for Englishmen. The maximum width is 77·8 per cent. of the maximum length. The forehead is comparatively narrow (85 mm.), although high and prominent. The height of the vertex of the skull above the auditory meatus is 116 mm.; its height above the sub-cerebral plane, 96 mm.; basi-bregmatic height, 133 mm.

THE FACE.

The shape and proportions of the face are also feminine, the upper face length is 65 mm.; the total face length (naso-mental) 107; the bizygomatic diameter 116; between the angles of the mandible 95. The face was thin, oval, and of rather small proportions. The muscular processes are developed to rather less than a medium extent. The frontal eminences are distinct; a transverse shallow groove on the forehead separates the eminences from the supra-orbital and supraciliary processes, which are very moderately developed. The infra-orbital (canine) fossæ on the superior maxillary are deep and wide depressions; the mental eminence is moderately developed. The exact development of the various structures mentioned may be estimated from the drawings.

TEETH, PALATE, AND MASTICATION.

The size of the teeth and palate may be estimated from the exact drawings given in Figs. 3 and 4. The incisors meet exactly in an edge-to-edge bite, not in the scissors-like bite of most modern Europeans, where the lower incisors pass up behind the upper. It is clear that in mastication there was a free side-to-side movement, the grinding surface of the lower teeth being drawn across those of the upper. The teeth of the left side are more worn than those of the right. In life, all the teeth were present and free from disease. The palate is flat and well-developed, the vault rising 15 mm. above the grinding level of the molar teeth. Although absolutely small, the palate is relatively large to the rest of the face. The size, shape, and width of the palate, of the mandible, and of the teeth may be seen in the accompanying drawings. In the upper and lower molar series the teeth diminish from the first to the third. The shape and size of the palate, and the manner in which the teeth are worn, are altogether unlike what is seen in modern English mouths, and if they do not assist us to fix the date of the skull, at least serve to assure us that it is not modern.

THE ORBITS AND NOSE.

The face is narrow, and hence the width of the orbits is about equal to their height (33 × 33 mm.), the right orbit being slightly the wider. The nose is

extremely prominent and narrow—a consequence of the oval type of face. The width of the nasal aperture—defined by a sharp margin of bone as in modern crania—is 22 mm.; its height (nasion to subnasal spine) 53 mm.

The point of the bony nose projects 33 mm. in front of the outer margin of the orbit (*see* Fig. 1) and 25 mm. in front of the infra-orbital margin. Prominence of nose can be thus recorded—perhaps more accurately than by any other method. A narrow, prominent nose is usually regarded as a sign of modernity. The prominence is not due to an outgrowth, but to a retrogression of the masticatory parts of the upper jaw and molar.

BONES OF THE UPPER LIMB.

The type of bone is that seen in people who live indoor lives, slender, well-formed, with moderately marked muscular impressions. The total length of the right arm is 686 mm., being made up as follows: humerus 293, radius 225, hand 168. The clavicles measure together 269 mm. (right 133, left 136), and the distance from the tip of one shoulder to tip of the other may be estimated at 215 mm. The span of the arms was probably about 1,580 mm.—49 mm. less than the stature. It is possible that the spinal length of the body may have been somewhat over-estimated, but, on the other hand, women have a span relatively short to their stature. The ulna measures 245 mm. (right), 243 (left). The right scapula measures 146 mm. from the upper to the lower border at its vertebral base, and 90 mm. from the margin of the glenoid cavity to the vertebral border opposite the base of the scapula spine.

EVIDENCE OF RIGHT HANDEDNESS.

There is a marked specialization in the right arm, seen especially well in region of the shoulder joint. The posterior border of the right glenoid is thickened and rounded. The axillary border of the scapula is 15 mm. in breadth (10 mm. on the left); the acromial end or epiphysis of the right scapular spine has remained free; it has united in the left; the total length of the scapular spine is 131 mm. in the right by 23 mm. at its widest point, while the corresponding measurements on the left are 127 × 21 mm. On the other hand, the distance from the glenoid cavity to the vertebral border is 94 mm. in the left as compared to 90 on the right. The left clavicle is 3 mm. longer than the right, but the right is the stouter if shorter bone. The measurements and diameters of the head of the right humerus are 3 to 4 mm. greater than of the left, and this is also true of the length and thickness of the shaft and area of muscular insertion (shaft of right at deltoid impression = 20 mm). The difference in the bones of the right and left forearm and hand is less marked.

Ulna, 245 right, 243 left.

BONES OF THE LOWER LIMB.

The total length of the right femur is 417 mm. (the left is more, 423), the right tibia 359 (left 358); the height of the foot 72 mm. In estimating the height

of the lower limb 12 mm. must be deducted for the internal malleolus of the tibia: total height of right lower limb = 836. The mid point of the body is thus situated about an inch (24 mm.) below the upper level of the hip joints, or in the natural position of parts, about 30 mm. above the symphysis pubis—a normal or average position for a woman. The femur is a slender but well-modelled bone, not flattened in its upper third as is so common in the neolithic man. The diameters of the shaft in the upper third are 27 (transv.) × 21 (antero-posterior): in the left bone, 26 × 21; in the middle of the right shaft these measurements are 21 × 24; left shaft, 21 × 25. The extreme breadth of the lower extremity is 77 mm. on the right, 76 on the left. The diameters of the head 44 × 44; the shaft is strong bent, convex forwards. The depth of the concavity is 35 mm.

The tibiæ are of almost equal length—right 359; left 358. Opposite the nutrient foramen the shaft measures 30 (antero-posterior diameter) × 20 transverse, and is there flattened, but not markedly so. The posterior border of the upper third of the shaft carries the origin of the soleus muscle.

The total length of the foot, allowing 15 mm. for the missing middle and terminal phalanges, is 205 mm.—a foot of small dimensions with highly developed arch; the great toe, one may judge from the articular head of the metatarsal bone, was certainly not turned outwards as in races addicted to boots, but markedly inwards as is seen often in barefooted tribes.

THE THORAX.

The ribs are well but rather delicately modelled. The chest at the level of the lower end of the sternum I estimate, from the size and bend of the ribs, to have been 200 mm. wide by 130 mm. back to front; a relatively wide and rather flat chest. The sternum is in the usual three parts. The manubrium is 47 mm. long by 50 mm. wide, the meso-sternum 66 mm. × 26 mm. In size and proportion the thorax and sternum are those of a woman.

QUESTION OF RACE.

It seems futile to discuss the race to which this individual belonged, for to-day women showing the same size of body, the same form of face, the same diameters of the head, can be seen plentifully in our modern population. In Mr. Parsons' report on the Rothwell crania there are several which show the same proportion of cranial measurements. All we can infer from this find is that the racial type found at Walton-on-Naze persists to-day; the origin and derivation of the type needs much more research and more evidence as to the distribution of race forms in ancient Europe.

NOTES ON THE KAGORO AND OTHER NIGERIAN HEAD-HUNTERS.

[WITH PLATES XIX–XXII.]

BY MAJOR A. J. N. TREMEARNE, B.A., Dip.Anth. F.R.G.S.

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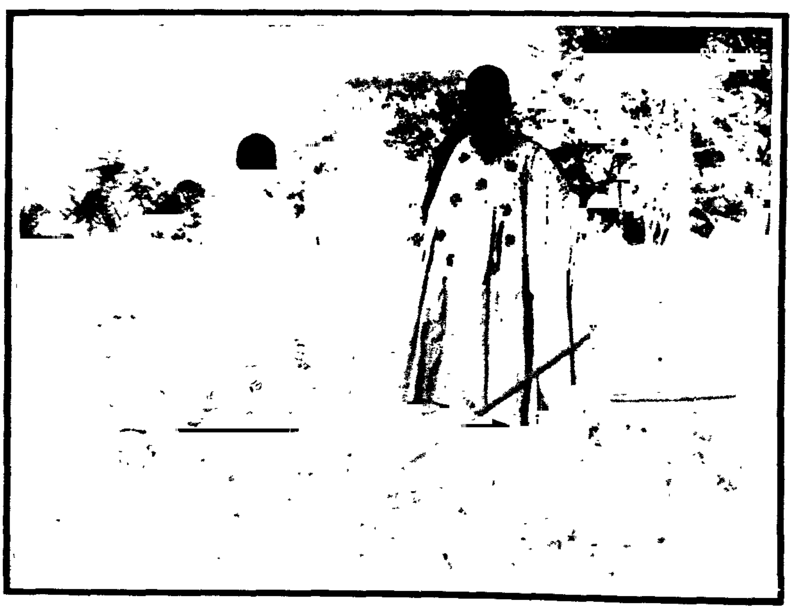


FIG. 1.—GANNAWARRI CHIEF AND WIFE, AND THE D.H.M. OF MOROA.

INTRODUCTION.

These notes were written in 1909–1910, and a good deal of the less technical portion has since been embodied in *The Tailed Head-hunters of Nigeria* (Seeley and Co.), but owing to the courtesy of the Royal Anthropological Institute in allowing me to delay publication, and to the arrival of my friend Lieut. G. R. K. Evatt, I have been able to give some different photographs in this article, so it and the book do not overlap. These notes do not claim to be anything like a full description of the people with whom I was in touch for twelve months. In addition to the usual obstacles, I should mention that a patrol had punished some of the tribes in June, 1908, just before I arrived at Jemaan Daroro; I accompanied one twelve months afterwards (August, 1909); another went there last year, and there are rumours of more. It is therefore likely that a few statements may have to be modified when these tribes have been longer under observation, though in all sixteen authorities were examined, and no statement is made on the word of less than five of them, or else on the evidence of my own eyes. Luckily nearly all spoke Hausa, so we could establish direct relations, and, although they were sometimes shy, I soon became quite friendly with them. As tin has been found near their country these people, now utter savages, will no doubt in a few years be delighting in top hats.[1]

The sixteen authorities on the Kagoro, Moroa, Attakka, and Gannawarri customs, etc., were :—

1. *Kaka,* Agwam (chief) of Fada Kagoro, and Government District Headman (D.H.M.) of the Kagoro District.
2. *Abomong,* Government Headman of the Moroa District.
3. *Koshiyo,* Agwam of Kaderko.
4. *Gajere,* Agwam of Safwio.
5. *Taggan,* Agwam of Kukkum.
6. *Makka,* Agwam of Chanji.
7. *Bissan,* Agwam of Ogban.
8. *Ettiyen,* Agwam of Apak (there are two).
9. *Alak,* Agwam of Tuku Tozo.
10. *Tagamma,* interpreter, of Fada Kagoro.
11. *Machu,* blacksmith, living temporarily in Fada Kagoro.
12. *Allah Keauta,* ex-blacksmith, who once lived in Fada Kagoro.
13. *Mohamma Suda,* Government Court messenger, formerly a trader.
14. *Kura,* chief of Kaura.
15. *Arikia,* wife of Machu.
16. *Lahidi,* Hausa girl, once enslaved by a Moroa Agwam.

[1] Jemaan Daroro is now (June, 1912) an important mining centre.

The authorities on the Kajji and Jaba customs, etc., were:—

1. *Sintali*, Government Headman of Kajji.
2. *Musa*, chief of Mersa.
3. *Limam*, employé of the Sa(r)rikin Jemaa.
4. *Awudu*, son of Musa.

Also some of the above sixteen.

I.—COUNTRY—ORIGIN—HISTORY OF THE KAGORO, MOROA, AND OTHERS.

Country.—The Kagoro, an almost naked, head-hunting West African tribe, occupy part of the north and west faces of a ridge of steep, high mountains running from the Bauchi into the Nassarawa province of Northern Nigeria. Most of the towns are built at the foot of the ridge, and nearly all on the north face are defended by labyrinths of cactus[1] hedges which sometimes reach a height of 12 to 15 feet. There are no stockades. The towns and populations in order from the south are:—Tuku Tozo (150), Tuku (150), Jigya or Jigga (150), Tafa and Ungwal Giginnia (300), Chanji (200), Ogban (1,500), Kukkum (1,000), Fada Kagoro (1,500, the capital), Apak (500), Turap (400), Safwio (200), Duchui (150), and Kaderko (150). Opposite Fada Kagoro is Malagum (500), while Mafor (100) and Makabbo (100) face Duchui and Kaderko respectively. The total population is therefore about 7,000, but this estimate is only approximate, for it has, up to now, been impossible to assess the people properly, as most of them run away on the appearance of a European. The neighbours of the Kagoro are—to the east, the Attakka and Gannawarri; to the north-east, the Moroa; to the north, the Katab; to the north-west and west, the Kajji[2]; to the south-west and south, the Numuna and a mixture around the town of Jemaan Daroro; and to the south-east, the Ayu and Karshe tribes.

Origin.—The Kagoro say that they came long ago from Bauchi country westwards to Nimbia (Nassarawa), and from there they passed, after a short stay, to where Fada Kagoro now is. The leader of the party was Apak, after whom one of the towns is named. They there found the ruins of habitations of a former forgotten people—perhaps the makers of the stone axes said to have been discovered in the vicinity.[3] The Kagoro themselves say that they have always regarded these as having been made by the splintering of rocks by lightning (this seems to be a general belief amongst the natives), and have never heard of their being used as tools, but the *Agwam* of Ogban recognized one shown him as an axe.

As the people have no records of any kind the account of their origin is very hard to prove or disprove. One thing which supports their story—an important point, too—is that in the towns on the northern face the sacred groves are all

[1] The word cactus is used for want of a better, the plant is probably a species of euphorbia.

[2] The official spelling, Kaje, does not represent the sound at all, it is almost "Kudgy."

[3] I was given some stone axe and hammer heads from a neighbouring district, but I did not succeed in obtaining any actually from the Kagoro country. In Jemaan Daroro barbers adopt some of the flatter heads for use as razor sharpeners.

to the south, and the people first look in that direction when performing their mystic rites (see page 164), the reason given being that they face their place of origin, while in those on the western face of the range the groves are to the north, and these towns, we know, are colonies from Fada[1] Kagoro. As nothing is known of the languages of the Bauchi plateau no comparison can be made, but it is worth noting that the salutation is almost the same (*sham* or *sha*), though the tribes do not visit one another, and all are head-hunters. Again, tobacco has been smoked for very many years in the north, yet the Kagoro did not know it, for their adoption of the Hausa name for it (and many other things) proves that it must have been introduced comparatively recently. A difference, however, should be mentioned, namely, that the Bauchi peoples wear "cases" while the Kagoro do not.

One is at first apt to be led astray by the fact that the tribal marks of the Kagoro, Moroa, Attakka, Katab, and Kajji peoples are identical, and their customs similar, while the languages are much alike—especially those of the Kagoro, Attakka, and Moroa. However, the Kajji, Katab, and Moroa claim their descent from Zaria (to the north or north-west), and none of these tribes could have driven the Kagoro to where they now are, as although much more numerous, they are not so warlike. The similarity of the tribal marks is said to be due to the fact that about two generations ago the Katab had a very skilful operator who invented the pattern, and that people of the surrounding tribes visiting the town liked it so much that it became universal. Both Kagoro and Moroa have told me this, and the Sa(r)rikin Jemaa[2] supports the story, so possibly it is true, though it is certainly strange. But it must have been more than two generations ago, for even the oldest men have the marks, which they say were done in their youth. Peoples of the same origin, though they may fight, never keep the heads of victims as trophies, even if taken during the actual fighting they are given back on the declaration of peace to be buried. Now the Kagoro did take and keep Kajji and Moroa heads, but not—so they say—those of the Attakka. However, the Katab and Kagoro swore an agreement long ago not to do so, an agreement which has been kept, and as all say that their ancestors had no connection this does not prove very much. Finally, the Attakka even now occupy the hills above Nimbia, and their villages are built in a similar way to those of the Kagoro—though rather higher up—while the Moroa, Kajji, and Katab inhabit the plains, so I should say that the Kagoro and Attakka had a common origin from the south, and before that from the east, while the other tribes came from the north and west.[3]

It is said that when the Kagoro first came to the country they now inhabit they did not know the use of the bow and arrow, and this is possibly correct, for the Sa(r)rikin Jemaa told me that the Attakka learned their arrow poison from the Kibbo (Bauchi) only about twenty years ago, and that *they* taught the Kagoro;

[1] *Fada* means "capital."

[2] He died last year, and was succeeded by his son. *Sa(r)riki* is the Hausa for "chief," the -n is short for *na*, "of."

[3] See page 143.

the Gannawarri use spears to-day. The place was so overrun with wild beasts that they had to live under ground and make tunnels to their farms, so I was told. This makes one suspect that they were originally troglodytes, like the Nadu tribe to the south; they still have caves where they store their food, and which they use as hiding-places when attacked.

History.—It seems that for a long time they were ruled by councils of elders, and that it was not until the Kajurawa[1] forced them to pay tribute that they chose a chief. There had been desultory fighting for many years without much result on either side, but about one hundred and twenty years ago, so far as I can make out—possibly due in some degree to the wanderings of the Filani—the Kajurawa demanded a regular payment, and the Kagoro were not strong enough to resist. Two slaves had been asked for, so the Kagoro called a council to decide what should be done. A youth, Gundong, said he would supply the slaves if he were made chief (*agwam*), and this having been agreed to, he struck a silk-cotton tree (*ukum*) with his stick, and immediately two young slaves appeared, a male and a female, who were given as tribute. A simpler explanation occurs to one who knows their gentle habits, and that is that this was the beginning of the capture of passing strangers, which has been stopped only during the last three or four years. In fact, the Kagoro say that before that time they were not head-hunters, nor had they any slaves.

Gundong was thus the first *agwam*. He is said to have reigned fifty years, and on the day of his death the *ukum* tree withered and died. His brother Bishut followed and lived for another forty years. This would be quite possible if Gundong had been born when his father was eighteen (Kagoro marry much younger), and Bishut (by a different mother) when he was fifty. There was an interregnum for a number of years when Jigya, or Jigga, played the part of a tyrant, and at last had to run away and found a town of his own. The people then appealed to the Sa(r)rikin Jemaa to choose a chief, as they could not agree amongst themselves, and each town was fighting its neighbour. Bishut's son, Mungu, was appointed, but he died seven years afterwards, and was succeeded by Kaka, his brother, the present ruler, who was appointed District Headman (D.H.M.) by the Government in 1905. These chiefs were in no way subject to the Filani, although they asked the Sa(r)riki to choose them a chief, for although Jemaa, with Zaria's help, several times defeated the Kagoro, they also suffered some reverses, and never succeeded in subduing them nor in making them pay tribute. The Kagoro's first experience of a British expedition was in 1905, and since then conflicts have taken place annually, and even yet three of the towns are not under control; I had to recommend two patrols in 1909.[2]

[1] *Kajurawa* is the Hausa plural. I have kept to the singular of the other names up to this in order to avoid confusion, but an s will be added in future if necessary.

[2] The first inflicted but little punishment as there was hardly any resistance, and operations had to be suspended on account of the rains. The second was opposed, and the medical hammocks were captured and kept for some time as trophies of war. On this occasion three of the Europeans and many of the native soldiers and carriers were badly stung by bees.

After Gundong had given his slaves, the head of each family took it in turn to provide the annual contribution, and would seize even his own grandchildren. They have now been roughly assessed, and most of the towns have paid tribute to the Government direct, the Chief of Jemaa not being given the position of suzerain, as he was unable to conquer them before we came. The *Agwam* of Fada Kagoro takes one-tenth of the total to compensate him for the trouble of collecting it, and as pagan chiefs seldom have much power over their people—who beat them if strong enough—he does not get overpaid. The incidence is about 1½*d.* per head, not a ruinous tax.

The Kagoro *agwam* is appointed by selection (now, of course, subject to Government approval) of the elders. The choice will apparently alternate between the families of two descendants of the first chief, for I am told that the next *agwam* will be one of Mungu's sons and not one of Kaka's. Females cannot succeed. The authority of the *agwam* is nothing like that possessed by the *meakwap*, who lead all the sacred rites and administer the ordeals. Apak and Kukkum have a kind of deputy *agwam* in addition to the principal chief.

There are councils consisting of all the heads of families, they form courts to try important cases, consult the oracles *re* war, etc., and practically control the chiefs.

The late Dr. Keane in *Man, Past and Present,* page 46, mentions a tribe of Kagoro, but they are apparently a branch of the Mande family much farther to the west, and so can have no connection with these people. The whole passage is :—

"The Mandingans proper of the Kong plateau may fairly claim, despite their late servitude to the Fulah conquerors and their present ready acceptance of French rule, to be an historical people with a not inglorious record of over 1,000 years, as founders of the two great empires of Melli and Guiné, and of the more recent States of Moasina, Kong, and others about the water-parting between the head streams of the Niger and the rivers flowing south to the Gulf of Guinea. Here is the district of Manding, which is the original home of the *Manding' Ké, i.e.,* 'People of Manding,' as they are generally called, although *Mandé* appears to be the form used by themselves . . . . Capt. Binger (*Du Niger au Golfe de Guinée*) . . . gives the subdivisions of the Mande family, named from their respective *tanné* (idol, fetish, totem)."

The late Lieut. Boyd Alexander mentions in his *From the Niger to the Nile* that the people in the Nassarawa Province wear tails as well as discs. In vol. i, page 206, he writes :—"Two days from Koninkum brought us into the Kachi-Panda hills, where lives a pagan tribe which does not recognise marriage customs. Only leaves are worn, or many of the women wear nothing more than a curious ornament, which is cylindrical in shape, about 8 inches long, and made of twisted rope. When the ornament is encased in brass it denotes virginity. It is hung down over the lower part of the back and kept in position by a string round the loins. It has a quaint effect, and at a little distance gives one the impression of a tail."

The "Kachi" is evidently the Kajji (or Kaje) country, but the Yesko people who live at Panda do not wear tails, being, I think, an offshoot from the Hausa ; the people Lieutenant Boyd Alexander saw were evidently Jaba. The marriage customs are really very intricate, but unless a European spent some time amongst these people he would not hear anything of them—it is wonderful that he collected as much information as he did. The sign of virginity is a girdle made of string (*ivyan*), not a tail ; the brass case would simply denote that the married woman wearing it was rich or extravagant, the only time an unmarried girl would wear a tail would be at a festival, in much the same way as our children take grown-up parts at a fancy dress ball, as is explained later.

The table of reigns seems to be as follows:—

0.	Council of Elders	? –1790
1.	Gundong	1790–1840
2.	Bishut	1840–1880
0.	Interregnum	1880–1898
3.	Mungu	1898–1905
4.	Kaka	1905– ?

The Attakka are not yet under control,[1] so it has been impossible to study them. They are head-hunters like the Kagoro, they dress in the same way, and their customs are said to be similar. They probably number about 7,000. One woman is seen in Plate XX, Fig. 3.

The Gannawarri have been patrolled, but have not been thoroughly subdued. They are nearly naked cannibals, their attire being different from that of the Kagoro, also their customs. They were not in my district, and I was unable, therefore, to visit their towns, though I went a little way into their country to settle a quarrel. The principal chief and a new wife are seen in Fig. 1 in text.

The Moroa say that their ancestors came from Zaria country to Kafanchan (north of Jemaan Daroro), and from there Enniluchwi and his wife went east and founded Ungual Tukunia or Chori, some time before the Filani came (about 1730 ?). He is said to have been the father of all the Moroa, and to have reached the age of one hundred years. After him came Yakwurrum of Babban Gidda (Hausa, "big house"), 10 years; Daudu of Mansha, 8; Rubu, 10; Unkwommakai, 15; Dawia of Chori, 50; and Abomong (shown in Fig. 1 in text) of Mansha (now 8), the present District Headman appointed by the Government. The Moroa resemble the Kagoro so much that—except where differences are noted—what is said of one tribe applies to the other, and this is also the case with the Kajji. One naturally thinks that since their languages and customs are similar the Kagoro and Moroa must be related. Both were, however, emphatic in their denial of this. Many of the Moroa towns have Hausa names (as have also two of the Kagoro), so it is evident that they were ready to learn the language of people near to them, and if the Kagoro were cut off from people to the south, they would probably learn the languages of those to the north all the sooner.

The Katab are mostly in Zaria province, only one town being within the Nassarawa boundary, and I could not therefore study them. I was told that they originated in Kachicherri, north of Moroa. "There is a big rock, the Dutsin Kerrima, where sorcery is practised; cattle were sacrificed there long ago. The demons[2] are very powerful, and earth is taken from the rock by the Filani and mixed with potash for their cattle. Years ago Awudu Sa(r)rikin Zaria, when

[1] A patrol visited the country in December, 1909, and subdued them.

[2] This account was given me in Hausa, the word used was *aljan*, not *kurua*, a spirit, shadow.

subduing the Katabs, gave the people a black bull to sacrifice on the advice of his malams.[1] Even now on Sunday and Friday nights the hill is luminous, and white cattle mount on top of the rock and walk about tended by a white Filani girl." I could not test the truth of this, the mountain may be a volcano.

The Kajjis claim descent from the north-west.[2] They also resemble the Kagoro, but not so much as the Moroa. They are now thoroughly under control (as are the Moroa). I have given several photos of them.

All these tribes are very good agriculturists, the Moroa being perhaps the best. They raise a great deal of guinea-corn and millet every year, but unfortunately make most of it into beer, so that from June to October they are usually in a state of semi-starvation, and have nothing but some bitter roots and what they can buy or steal.

II. Anatomical Observations—Measurements of Living Body—Measurements of Skulls—Abnormalities—Physiological Observations.

Anatomical observations.—Both men and women of the Kagoro, Moroa, and Kajji tribes are well built, and have rather slim figures. I was unable to measure any females, but secured the following numbers of the opposite sex:—Kagoro 72; Kajji, 55; Moroa, 1; crosses Kagoro-Kajji, 2; Kagoro-Attakka, 1; Kajji-Katab, 1; and Moroa-Katab, 4. The measurements of height must be considered as rough, owing to the difficulty of getting the subjects to hold themselves correctly. Those taken with the anthropometer are, I hope, accurate, though no allowance has been made for error. Full details are given in the Appendix.

The Kajji seem to be rather taller than the Kagoro, and to have larger heads; but these measurements have not yet been taken in sufficient numbers to show any racial difference, so I do not put forward these variations as a support to the theory that they are different tribes, though it is tempting. Massage (see page 152) must have a great effect on the shape of the head.

[1] Mohammedan priests or learned men, also magicians.

[2] Canon Robinson (*Hausaland*), describing a journey from Keffi (or as he more correctly spells it, Kaffi) to Zaria, *viâ* Kachia, writes (p. 68): "The inhabitants of this district, many of whom wear no clothes of any kind, whilst others are content with a girdle of leaves, are a most degraded and unintelligent-looking set of people. According to the statements of our carriers many of them are cannibals, though we were not able to obtain any definite proof of this fact." And again (p. 73): "The people through whose country we are now passing belong to the Kedara tribe; prior to this our route for about fifty miles lay through the country of the Kedje [Kajji], who are for the most part professional brigands, few of them wear anything more than a girdle of leaves or a piece of skin." The Kajji must evidently have been much farther to the west when he wrote (1894) than now. He does not even mention the Jaba tribe, who occupy a good deal of that country at the present time.

No. of Observation	Nature of Observation.	(72) Kagoro.	(55) Kajji.	(1) Moroa.	(2) Kagoro-Kajji.	(1) Kagoro-Attakka.	(1) Kajji-Katab.	(4) Moroa-Katab.
1	Age	32·37	33·25	35	42·5	45	35	35
2	Skin 2	3	—	—	—	1	—	2
3	„ 3	17	23	—	—	—	1	2
4	„ 4	17	7	1	2	—	—	—
5	„ rough	22	16	1	1	—	1	4
6	„ smooth ...	15	14	—	1	1	—	—
7	Hair colour	Always black in the young, growing grey in the old.						
8	„ kind	In tufts in all cases.						
9	„ quality ...	All have coarse hair.						
10	„ quantity ...	Youths have plenty, but it is liable to become thin in old people.						
11	Eyes, dark	24	17	—	—	—	—	2
12	„ A	23	21	—	—	1	1	—
13	„ B	23	16	1	2	—	—	1
14	„ C	2	1	—	—	—	—	1
15	„ deeply set ...	51	22	—	1	1	1	1
16	„ not deeply set...	21	23	1	1	—	—	3
17	Face, square... ...	5	2	—	—	—	—	—
18	„ oblong	10	7	—	—	—	—	1
19	„ shield	13	11	—	2	1	1	1
20	„ oval or egg ...	9	10	1	—	—	—	2
21	Nose prominent ...	19	16	—	1	—	—	3
22	„ and lips prominent.	10	10	1	1	—	—	1
23	Lips prominent ...	8	4	—	—	1	1	—
24	Cheek-boneprominent	28	16	1	1	1	—	3
25	„ „ not prominent.	9	14	—	1	—	1	1
26	Chin, broad	11	10	—	1	—	—	—
27	„ medium ...	7	1	1	—	1	—	—
28	„ narrow ...	13	14	—	—	—	—	3
29	„ pointed ...	6	5	—	1	—	1	1
30	Nose, straight ...	16	11	1	1	—	—	2
31	„ convex ...	5	7	—	—	—	—	—
32	„ concave ...	16	12	—	1	1	1	2
33	„ point thick ...	24	16	—	1	1	1	2
34	„ „ thin ...	13	14	1	1	—	—	2
35	Lips, thick	15	10	—	1	—	1	3
36	„ medium ...	16	17	—	—	—	—	—
37	„ thin	6	3	1	1	1	—	1
38	„ turned out ...	24	20	—	2	—	1	1
39	„ not turned out	13	10	1	—	1	—	3
40	Ears, flat	13	10	—	1	—	—	2
41	„ outstanding ...	24	20	1	1	1	1	2
42	„ large	15	11	1	—	1	—	2
43	„ medium ...	10	11	—	1	—	—	1
44	„ small	12	8	—	1	—	1	1
45	„ lobes large ...	16	16	—	—	1	—	3
46	„ „ small ...	21	14	1	2	—	1	1
47	„ „ attached	13	8	—	—	—	—	1
48	„ „ partly attached.	12	13	1	2	—	—	1
49	„ „ detached	12	9	—	—	1	—	2

Notes.—(1) Nos. 17 to 49 on 37 Kagoro and 30 Kajji only.

(2) The numerals and letters used for the shades of the skin and eyes respectively refer to the table of colours in *Notes and Queries on Anthropology*.

Measurements of living body (in millimetres).

No.	Nature of Measurement.	(72) Kagoro.	(55) Kajji.	(1) Moroa.	(2) Kagoro-Kajji.	(1) Kagoro-Attakka.	(1) Kajji-Katab.	(4) Moroa-Katab.
1	Height standing ...	1600	1683	1730	1594	1721	1660	1769
2	" " greatest.	1745	1872	—	—	—	—	1840
3	" " least...	1423	1373	—	—	—	—	1705
4	" sitting ...	862	844	864	810	845	830	868
5	" kneeling ...	1181	1253	1285	1162	1255	1240	1312
6	Span	1780	1868	1883	1732	1840	1772	2107
7	Head, length ...	187	191	194	185	199	202	197
8	" breadth ...	142	144	142	135	136	145	144
9	" C.I.	76·00	75·40	73·19	75·74	68·30	71·28	73·19
10	" greatest breadth.	83·14	84·83	—	77·83	—	—	76·02
11	" least breadth...	72·97	68·81	—	73·65	—	—	66·16
12	" height[1] ...	218	221	223	218	212	227	229
13	" circumference	540	554	553	534	560	570	568
14	Face, length	114	115	121	110	110	127	117
15	" breadth ...	123	139	142	136	138	134	140
16	" biorb. breadth	104	106	107	100	105	104	109
17	" naso - malar breadth.	114	117	120	107	112	117	123
18	Nose, length	47	49	52	47	52	45	50
19	" breadth ...	44	45	44	42	48	48	46
20	" N.I.	92·90	91·01	84·61	90·30	92·30	106·66	92·03
21	" greatest breadth	114·28	113·33	—	95·83	—	—	106·50
22	" least breadth ...	71·92	76·36	—	84·78	—	—	80·00

Measurement of Skulls.—I brought back thirteen skulls, which are now in the Anatomical Museum at Cambridge. Two (whitewashed) were those of Ayu people, and were obtained from the walls of the fetish house at Ayashi; five were those of Gannawarri who had been treacherously murdered by Moroa men at a beer feast in Babban Gidda the preceding March; and six were those of Kagoro obtained from Kajji towns. The latter were measured by Miss Tucker, B.A., of Newnham College, who kindly gave me the following results:—

	(1)	(2)	(3)	(4)	(5)	(6)
Glabello-occipital length ...	186	165	170	—	178	177
Ophryon-occipital " ...	183	165	168	—	179	175
Maximum breadth ...	133	124	132	127	139	135
Cephalic index	71 ·5	75 ·2	77 ·6	—	78 ·1	76 ·3
Basi-bregmatic height ...	—	130	129	—	138	139
Auricular-bregmatic height	123	115	115	—	124	124
Height index (1)	—	78 ·8	75 ·9	—	77 ·4	78 ·5
" " (2)	66 ·1	69 ·7	67 ·6	—	69 ·7	70 ·1
Nasal length	52	45	43	45	57	50
" breadth	28	25	25	25	28	28
" index	53 ·8	55 ·6	58 ·1	55 ·6	49 ·1	56
Nasio-prosthionic length ...	—	62	55	57	72	—
Bizygomatic breadth ...	127	117	118	—	137	127
Upper facial index... ...	—	52 ·9	46 ·6	—	52 ·6	—

[1] From chin to top of head

	(1)	(2)	(3)	(4)	(5)	(6)
Basio-prosthionic length ...	—	92	82	—	101	—
Basio-nasal length... ...	—	91	86	—	107	101
Alveolar index	—	101·1	95·4	—	94·4	—
Auriculo-nasal radius ...	93	84	80	—	93	93
Auriculo-prosthionic radius	—	94	89	—	101	—
Radio-gnathic index ...	—	111·9	111·3	—	105·2	—
Horizontal circumference...	505	467	480	—	515	506

Base of No. 1 absent. No. 4 much damaged.

Abnormalities.— There are no albinos nor persons with red hair, nor, apparently, any with an excessive amount or with none at all. Old people are looked after by their children—especially the fathers, but their death is nothing to be sad about —in fact, quite the opposite, for the older and more important the deceased the greater the "wake."[1] They are, however, never killed.

The hair turns grey and the teeth disappear in old people. It is said that there have been no cases of harelip, or cleft tongue or cheek, though children have been known who could not talk properly (cleft palate ?), but a few persons have been known who had extra fingers. A Moroa (named Bulwan) at Zankam had *three* thumbs on each hand (this was sworn to by three chiefs), and another (Kanga) of Magwok, had two fourth fingers on each hand ; a Kagoro (Kabboshio) had webbed feet. All the extra digits had nails. I saw a two-thumbed Ninzam boy at Augwom last August, but have not met any of the above. Nothing was done to these people, they were treated exactly like normal beings. I did not hear of any cases of deformed genitals nor of steatopygia. The umbilicus is often several inches long. One of the wives of the chief of Mersa had *mammæ* which reached almost to the waist.

If a child be an idiot or unable to move about, it may be thrown into the water, "*but not killed.*" This usually happens when the child is between the ages of one and four, but in some cases he may be given a much longer time in the hope that he will recover. "It is evidently a snake and not a human being. If after you have thrown him (or her) into the water you go away and then come back silently and hide yourself, you will see the child lengthen out into a snake." This was done at Jemaa and in the surrounding districts also. Matchu (blacksmith) says that his grandfather, Shobin, took a boy to the river-side and made him sit with his face to the stream. He and the boy's father gave the boy some *kunu*,[2] and while he was eating it they stole away and climbed a tree overlooking the river. Soon the boy glanced around, and seeing no one, began to grow until he was as tall as a tree, turning at the same time into a snake. Shobin and the father were terrified and ran away, the former tearing his leg during the flight, the mark, which he had to his death, being, of course, an indisputable proof of the

[1] See page 166.

[2] Native broth ; the narration was in Hausa.

truth of the story. It is possible that once, on some former occasion when a child was thrown in, a crocodile or some other monster leapt up and caught him, thus terrifying the onlookers and giving rise to this myth.

If Moroa give birth to an idiot or deformed person medicines are tried, even up to the age of ten years, if necessary. The mother will suckle it for some time, and if it does not become normal will leave it with the father and marry someone else. When the father is convinced that it is useless to expect any improvement, he calls in a Kagoro or Attakka priest, who will throw it into the River Kaduna. He himself has to hide, for the child turns into a pillar of fire and smoke and would consume him if present. The mother will never return to the house while the child is alive, lest it prevent her conceiving a normal child, but may after its death. Kagoro and Attakka have much stronger "medicine" than Moroa, so they do the drowning themselves. It is just possible, judging from this and from the fact that the Moroa's time of probation is so long, that the Kagoro taught them the custom.

Physiological Observations.—The habitual posture of the Kagoro in sleep is on the side, they sleep on short mats made from the leaf of the palm-tree. They squat to make water. The gait is rather slouching in most, but some move with a springy step; in any case it is difficult to judge exactly, for they are not at their ease in a European's presence, and probably do not walk naturally. They are not used to walking long distances, as they seldom go far from home. The arms are swung slightly, especially when carrying a load on the head, and the knees are slightly bent. They are, of course, barefooted. The few who have horses ride bare-back or with goatskins for saddles—no stirrups.

They seem to have no power of moving ears or scalp, nor of shutting one eye independently of the other, but if both be closed they can partly open one. It was impossible to test the sight and hearing. I do not think that their sense of smell is above the ordinary. They point with the open hand and do not seem to be able to extend any one finger fully by itself, the third being the most difficult. They can pick up staves (if carrying loads, for instance) with their toes, and grass is held in the toes when being plaited for roofs, but even the great toe seems incapable of much separate movement. I have never seen a male Kagoro voluntarily carry anything other than his hoe (hooked over the shoulder) or bow and arrows or staff (held in the hand); he does not trade, and the grain and wood is collected by the women, so the men have but little occasion to take loads on their heads.[1] They seem to have no tricks of sleight of hand. The people may attach short ropes to their feet in order to climb trees, pulling up first one and then the other, or notches may be cut for the climber to "swarm" up; it depends upon the size of the tree.

Astonishment is expressed by opening the eyes and mouth wide, and by raising the eyebrows; sometimes the hands are held up, palms outwards, about the level of the mouth, and in some cases the hand (palm inwards) is placed on

[1] But the women, of course, carry their loads thus.

the mouth, but this is not beaten as with the Hausa. The Kagoro frowns when considering a knotty problem—he seldom considers it long. I could not see any signs of blushing, nor did I manage to catch anyone quarrelling. To indicate that he thinks another is lying (*e.g.*, in a case in court) the hearer places his fingers to his mouth as if about to pull out something and makes exclamations such as "*Ah ah ah*" or "*Kut kut kut.*" It is possible this gesture was learnt from the Hausa; it is certainly very expressive. When happy, the eyes sparkle, the surrounding skin being wrinkled, the mouth drawn back at the corners, and if very merry the eyes become full of tears. Fear is expressed in much the same way as with us, viz., a look of horror, shrinking, and an attempt to run away. At this they are wonderful, the doors of their houses are very low, and they appear to throw themselves at them and literally dive in. One may be talking to a native sitting down a foot off, look away for two seconds and he has gone without a sound and without a trace. Disgust is shown by turning down the lower lip and giving vent to "*Um um*" or "*Kut kut,*" and frowning. To express inability to do or to prevent anything, the hands are extended outwards slightly in advance of the face, palms outwards. The head is thrown back for affirmation, and shaken for negation, while for emphasis the hand may be moved downwards from the face, palm outwards.

The faculty of attention is easily wearied, about half an hour of questioning is enough—another difficulty for the student. The memory seems to be but little developed, possibly through so much drunkenness. The people are not very curious nor anxious to learn new ideas, tools, etc., from their neighbours; they seem to be quite content to remain as they are, and simply say, "We Kagoro do not do so," or "Our fathers did not teach us." Thus even now none of them (nor of the Moroa and others) can forge iron or make their agricultural implements, although foreign—generally Hausa—blacksmiths have been with them for many years, and they will not wear clothes, in spite of the fact that during the harmattan season their climate is very cold. They are, however, learning Hausa, but not Filani, for the people speaking the latter—having been slave-raiders—are their natural enemies. As with most wild natives here, the idea of direction is good if they have once been to the places, but they travel very little and seldom leave their own country. They are courageous, and have made tribes much bigger than their own respect them. None have as yet been educated, so it is impossible to say whether they would readily return to their native state if once removed from their surroundings. They have such a strong love of freedom and conservatism, that I do not think they would relinquish their liberty nor take to any European customs without compulsion, and as that would be contrary to our principles, we let them alone so long as they keep their roads open and remain peaceful. The tax imposed is merely to remind them that they are no longer able to indulge in their little hobby of collecting the skulls of their neighbours without serious consequences.

III. Scarification—Painting—Ornaments—Deformations—Clothing.

Scarification.—All members of the Kagoro, Kajji, and Moroa tribes are scarified, and I am told that the same holds good with the Attakka and Katab. As mentioned before (page 138) the similarity of the design arises from a cause quite apart from any connection between the tribes, and resembles our copying the "latest Paris fashions"; before the present pattern was adopted, each tribe had irregular cuts on the forehead only. There seems to be no religious significance, the lines are simply to denote race, and this must be correct if what they say about copying those of the Katab is true. Again, while circumcision is performed only by a man specially appointed, the scarification may be done by the child's father, though the patterns on the chest are usually made by a particular man.

Males and females have the same marks on the head. These consist of numerous short perpendicular cuts right along the forehead, from ear to ear, and long slanting lines (13 or more) on each cheek from ear to chin (Plate XIX, Fig. 1).[1] In some cases (particularly amongst the younger men) a sort of zigzag is added to the lowest line (Plate XIX, Fig. 3), but this is not compulsory; the others are, except in Tuku and Tuku Tozo, where I saw Plate XIX, Fig. 2, which towns seem to be separating themselves from their northern relatives and to be desirous of settling down peacefully under Jemaa, for there are no hedges there, and the tails of the women are of a special shape. Men may have in addition patterns on the chest, composed of rows of cuts about ¼ inch to ½ inch in length and usually made slantwise, but they are voluntary and seem to be dying out; they are not confined to persons of rank.

I have noticed the following: Fig. 5 (See Plate XIX) was seen on Kaka, the present chief (*agwam*) of Fada Kagoro; Fig. 6 on Addam, *Agwam* of Apak; Fig. 7 on Ungbam (an Attakka mother) *Agwam* of Tuku; No. 8 on Alak of Tuku; No. 9 on Kyāna of Tuku; Fig. 10 on Kwoiya of Tuku Tozo; Fig. 11 (evidently a modification of 7) on Dunyo of Fada Kagoro; Fig. 12 copied, I think, from the Hausa, on Kogi of Tuku Tozo. I have examined every chief, only those mentioned had chest decoration, and these were the only patterns which I saw.

Amongst the Kajji I found the following: Fig. 13 on Buderi of Attar, Fig. 14 on Zurufu of Kachib. The latter, an arrow, coming up from a necklace behind each ear, has been copied from the Hausa, and is very common. Fig. 15 shows the marks made by Kafanchan people on *Mugunta*, a Kagoro of Kukkum, because he was caught when a child stealing maize there; this is the only instance of the kind which has come to my notice. The Kafanchan people must have also given him a nickname, as *Mugunta* in Hausa, which language they understand, means "wickedness." Fig. 16 looks something like a mixture of design as well as of blood in Abufoi, a Kagoro of Malagum, whose mother was a Kajji. Abomong, D.H.M. of Moroa, born of a Katab mother, had some slight variations in the

[1] Unfortunately the artist who copied my sketches did not make the lines on the forehead high enough, and the hair is made to appear long instead of short—or even shaven.

lines of his face from those of the general pattern. Those near the mouth came a little below its level and then up again to meet it, while instead of the zigzag he had six separate short lines underneath the chin, see Fig. 4.

These marks I was told are merely for the sake of ornament, they are not regarded as charms in any way. I could not find out what the patterns are intended to represent, the people said they did not know, and—if borrowed—this is probably quite true. Youths have the forehead scarified when able to hoe. The only raised scars I saw were on a Kajji man at Mersa, and this seems to have been an accident.

There is no doubt that Hausa patterns will spread, and be adopted even by the Kagoro, especially those which are supposed to have particular virtues—prevention of sickness, retention of wife's fidelity, etc. Many of the Kajji already have them, but they are not reproduced here as they have appeared in separate notes before.[1]

Women's chests and backs are decorated with a regular pattern, so there is no need for them to undergo fresh pain for the sake of acquiring additional beauty. The first to be done are those around the navel, Figs. 17 and 18, which seem to vary a little in design. When a girl reaches the marriageable age (with some this coincides with first menstruation) the chest and back will be scarified (Figs. 19 and 20), and when she goes to her husband the forehead (Fig. 1). There is no danger of a Kagoro girl losing her "marriage-lines"! The rows of marks (made as in the man's chest patterns) may be increased in number.

The scarifier is an important person, but he has not the exclusive right to operate on everyone. The office is practically hereditary, for no man would teach a youth other than his own son or nephew.

Painting.—At feasts (marriages, etc.) both sexes paint a black stripe about one inch wide from forehead to navel, and sometimes there may be a narrow line on both sides, or each of these lines may be divided into three, as in Fig. 21. No colours are used but black pigment and the red earth mentioned below, and no other designs are permitted. They are, of course, in addition to the scarifying. The pigment is obtained from the unripe kernel of a certain thorn-tree (Kagoro, *illak*; Hausa, *gaude*), which is pounded up, mixed with water, and applied with the crushed end of a stalk of guinea-corn. For scarifying (which is to be permanent) the incisions are painted with soot (*atchitchang*), from the bottoms of the cooking pots (*lan*), mixed with grease. The black and red are easily obtainable, so is white earth, but the latter is not used on the bodies, though it may be eaten (page 171). There are no special artists for the painting, the people do it to each other; but for scarifying a particular man is resorted to, if one wants it well done.

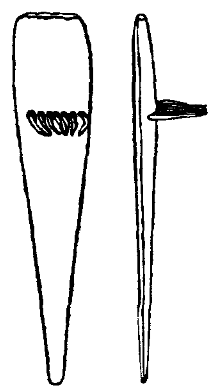
The women usually smear their bodies with red earth (mixed with grease if they can get it), and the men at certain times (*e.g.*, dances) may coat their legs up to the knees; this is said to be merely for the sake of ornament, but it may also keep off insects. No distinctive dress is worn for prowess in war, though a male was not

[1] See *R.A.I. Journal*, vol. xli, Jan.-June, 1911, page 162.

supposed to have attained to the dignity of full manhood until he had killed someone. There is a general idea amongst Jemaa people that he was not allowed to marry until this desirable feat had been performed, but the Kagoro deny this, and—judging by the early age at which youths obtain their brides—I feel inclined to believe them. On the return of the hero to his house, his whole body was smeared with red earth, and he was carried in procession on the back of a friend, the women of the quarter meanwhile dancing and waving their hands before him, and singing his praises.

It is rather surprising that they have not learned to put antimony (or sulphide of lead) on their eyelids, nor to stain their nails and hands with henna, as do the Filani and Hausa near them. They say they are afraid to ornament their hands lest it should interfere with their farming, and it is quite possible that this idea is fostered by the men so that the women will continue to do the hard work.

Ornaments.—No special badges of rank are worn, not even in war. The chiefs do not fight themselves, for a general is chosen by the people before the war commences, but they follow their men to drive them on if necessary (see page 174). Youths may dress their hair, girls and women shave their heads. With Kagoro some males, up to about the age of twenty, allow the hair to grow in a broad tuft from the forehead to the back of the neck like the women in Plate XXI, Fig. 3. Some Kajji say that a youth should not shave his head until he has two children, but this is doubtful. Some plait it instead, and ornament it with beads, as do the Kajji, or arrange it in the shape of a mop like the man in Plate XXI, Fig. 1. Young girls may do likewise, but shave the head when about six years of age, possibly because they have to carry weights (wood, water, grain, etc.), while the men very seldom do so. The older men usually allow the beard to grow—Kagoma may bind it in grass—but the moustache may be shaved at intervals. No shaving seems to be done while preparing for the harvest; I could not ascertain that there was any reason for this except that the men were too busy on the farms, but I suppose that there is a better one.



KIBBO ANKLE-PROTECTORS.

Open brass bracelets are worn by both sexes, and iron bands (probably obtained from the Gannawarri), on the calves of any men and old women who can afford them; they are, however, very rare. Beads (Plate XX, Fig. 3) and horsehair (Plate XX, Fig. 1) are made into necklaces for women, while light iron chains are hung by men around their waists and necks, especially if courting. Strings of beads (imported) are worn by all females. There are no toe-rings, but beads or beans are used for finger rings. There are no signets. All ornaments are removable except the metal cases around the legs. These seem to be a development of the wooden protection for the ankles used by the Kibbo; they are heavy and sometimes make the wearers' feet very sore, so that they have to tie grass or bandages of leather or cotton for them to rest on; they are valuable, and are kept in the family.

Deformations.—Both lips of the women are pierced (see Plate XX, Fig. 1) for the reception of pieces of wood called *tichiak,* which may be over 1 inch in diameter and about $\frac{3}{4}$ inch high (Plate XIX, Fig. 22). Sometimes the outer face is ornamented with beads, tin, or coloured earth. They are easily removable, and are taken out before the mother sucks the stump of the umbilicus (see page 173), but are supposed to prevent females eating fowls or dogs (see page 160). These people do not kiss each other, so there is no objection to the *tichiak* on that score. The lips are usually pierced when the girl is about seven or eight; at first, stalks of grass are worn and then sticks of increasing thickness, until the *tichiak* itself can be inserted. These are of varying diameters, and when very large make the lips project so much that sideways the wearer has a pig-like appearance (note the Attakka woman in (Plate XX, Fig. 3)).

Both ears are pierced in the women, only the left in the men, and they are treated in the same way as the lips; in the southern towns the piercing of ears in males is not compulsory. Beads, usually in the shape of blue glass rings, are bought from Hausa and other traders and worn, but if these be unobtainable string or sticks will do. There seems to be no way of mending torn lobes, for I have seen several in spite of the fact that ear-rings are so light. The nose is not pierced, as with the cannibal Nadu to the south (*septum*) (see Plate XXI, Fig. 1) and the Beriberi of Bornu (right nostril), nor flattened. Teeth are not filed, as with some Mada (see Plate XXI, Fig. 2), nor broken.

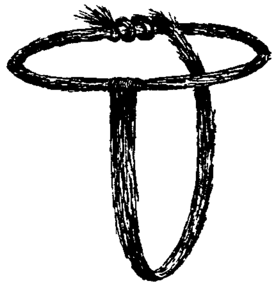
The heads of infants are massaged backwards to keep them from becoming too broad (see page 173), both sexes being done in the same way; the mothers (who do it) warm their hands first and use grease. The mode of carrying children (see page 173) does not influence the shape of their heads much. The women may bind themselves tightly after childbirth to avoid becoming permanently fat.[1] There is no artificial elongation of the *mamma.*

There is no deformation of the feet or fingers, nor castration, nor production of artificial hypospadias so far as I could ascertain.

Clothing.—The chiefs who have been recognised by the Government wear Hausa robes and are called *agwam,* no other Kagoro wears any cotton of any kind, but Kajji and, to a less extent, Moroa buy clothes from the Hausa if they can afford them (see Fig. 1 in text and Plate XXII, Fig. 1). The males wear a leather triangular loin-covering after they have reached the age of six or eight, possibly earlier if the father happens to have skins to spare, Moroa and Kajji may wear cotton loin cloths like those of the Mama in Plate XXI, Fig. 4. Some wear another skin over the shoulder as a cape, the two front legs being tied together to serve as a cord, enabling it to be shifted to the side exposed to the wind or rain. Both garments are made of goatskin, the hair being left on the latter, that for the loins being tanned. There is no special "tailor"; the skins are prepared

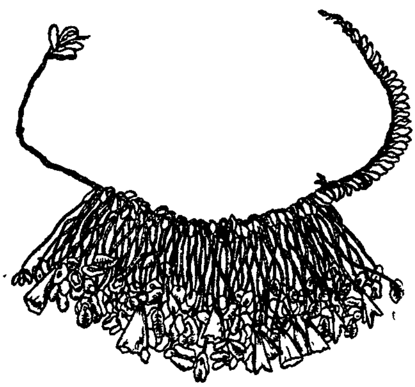
[1] So it is said: I have not seen any do so.

by the wearers themselves. The men do not wear "cases" like the Gannawari (see Fig. 1 in text), for they are circumcised.[1]

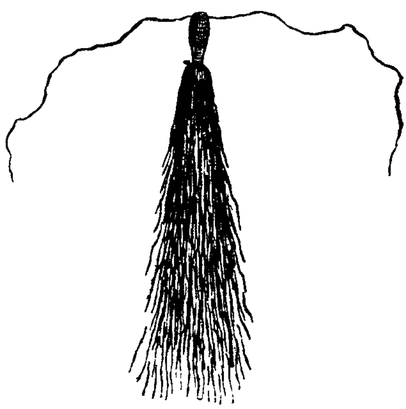


THE IVYAN.

Girls from three to four until married wear the *ivyan,* a girdle of loose native string—not plaited nor twisted—which is tied around, but lower than, the waist, a long end passing from below the navel between the legs to meet the girdle again near the small of the back. This is an absolute sign of virginity. Married women wear a tail (*kunnok*) instead of the girdle, which is in shape something like a mushroom, some are long and thin (Plate XX, Fig. 2), others are short and stumpy (Plate XX, Fig. 3). The tail is made of a palm fibre very tightly drawn together and bound with string, the wide wheel-shaped part being plaited like basketwork, some are left thus, others are coloured red with earth to match the wearer's body. The next step in ornamentation is a row or two of beads around the edge, then brass wire may be bound around the body or it may be covered with sheet brass, finally the under part may be decorated with beads in a regular pattern. The brass is, of course, obtained from the Hausa; the beads (from them or other traders) are strung on threads and then stuck on with liquid rubber, of which there is plenty in the country, they are not sewn in any way. The fancy patterns were, I think, invented by the Jaba, a tribe to the west of the Kajji; they are extremely rare amongst Kagoro women. Two strings of the same material attach the tail to the waist. These peculiar articles are probably responsible for the old belief in tailed people in Nigeria. Kagoma virgins wear an apron of strings dyed green, to which are attached cowrie shells and brass bells.



KAGOMA CHASTITY APRON.

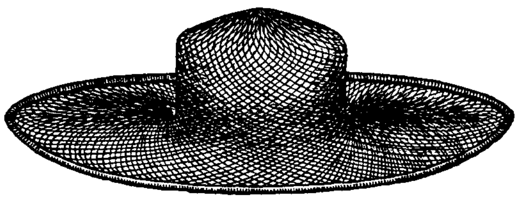


KEDDARA WOMAN'S TAIL.

When a girl has been married, her mother takes off the girdle, and a small branch or bunch of leaves is hung to a string to hide the parts in front (Plate XX,

[1] It seemed to be the case that tribes either wore cases *or* practised circumcision; they did not do both. Different kinds of cases are shown in Plate XXI, Figs. 1, 2. and 4.

Fig. 1). Many women—especially when old, apparently—wear leaves both fore and aft, but this is not compulsory, those in front are a sign of marriage. At certain times (dances) leaves may be worn by young girls, and this perhaps corresponds in some degree to our taking grown-up characters at fancy-dress balls. Keddara women wear a tassel-like tail of loose string (see Plate XXII, Fig. 2 (22)). A girdle used by Ninzam is shown in Plate XXII, Fig. 2 (26). Tails and loin-coverings are not sacred to the owner, and if in good condition at the time of the wearer's death may be passed on to other members of the family. It is just possible that these tails may be a survival of a phallic cult, for:—(1) *Kunnok* means "orphan," which may indicate that it is alone on the back, or more likely that a child (also carried on the back) is the result of connection with the male organ; (2) the shape is certainly suggestive; (3) virgins do not wear them (see above), only married women, and not even they during a period of widowhood (page 174). However, no Kagoro, Kajji, Attakka, or Moroa woman would dare to attire herself in any other than the prescribed fashion, though the only punishment which would be inflicted is, apparently, the disapproval of her people; the differences in the adornment and shape of the tail seem to be the only variations allowed. I have known girls taken away when young, and dressed in Hausa clothes, at once to discard these for the *tichiak* and tail on their return; but, on the other hand, the mutilation of the lips is not at all popular amongst women of other tribes. Having to judge once between a husband who wanted his wife (a runaway slave from Sokoto) *Kajji-ised*, and the wife herself, who thought her natural charms sufficient, I decided that she must adopt the leaves and tail as she was married to a Kajji, but that her lips were not to be touched, for the perforations should be done only when the girls are young. They seemed to be satisfied with the decision. So it was probably in accordance with their ideas.



HAT WORN BY NINZAM AND OTHERS.

No head-covering is worn by either sex, but a cape—something like the sack with one side cut open worn by coal-heavers—is made of palm leaves for protection against the rain. This may have been copied from those made by Hausa, their name for it (*kabiddo*) is often used. A three-cornered grass hat is worn by Ninzam, and there are round ones also. There are no coverings for the hands or feet.

The Gannawarri women wear a number of iron rings in front (see Fig. 1 in text) and a kind of leather brush behind, no leaves nor tail.

IV. Habitations—Building—Decoration, etc.—Reoccupation.

Habitations.—Houses (*bat alli*) are built of red or black mud and have grass roofs (*tsaza*). The walls (*kumfarak*) are 3 to 4 feet in height, the roof is higher at the back of the house than at the front (see Plate XIX, Fig. 26). Each house has one central door (*dakanyu*), or in a few cases two, opening into the compound. Each wife has a separate house for herself and her family. There is a porch or hall extending along the whole width of the house, where wood is kept, and a verandah outside that, where the people sit in wet weather during the day, or outside in dry weather on palm tree logs let into the ground. The porch has a doorway about 2½ to 3 feet high in the shape of a half-hoop; between this and the sleeping compartment there is another doorway closed by a sliding mat (*yiyit*) let into the wall—again reminding one of a railway carriage. The porch may also have a sliding door or else a curtain of string.

The arrangement reminds one somewhat of a Canadian railway sleeping car, the verandah resembling the open-air platform for observation, the porch the smoking room (where the fire is). Inside that are two compartments opposite one another, which can be compared to two sleeping berths; in fact, they are used as such, that on one side (I believe always the right) has a bed (*umburrap*) of palm fronds or bamboos raised about 1 foot from the floor, and is for the husband when he visits his wife, that opposite is for the rest of the family. Then further on is a circular room in the centre of which is a large earthenware vessel for holding grain, built on stones, and there may be other smaller ones also; this has a ceiling, and a manhole to pass through to the attic on top.

The dome of the roof is over the granary (*abak*), which is in the shape of an enormous vase and opens at the top, thus giving room for persons to climb into the attic and take the grain, and also—so they say—to keep the smoke away from the rest of the house. There is no chimney of any kind, but it naturally goes to the highest part and escapes through the thatch. The smoke is probably useful in keeping the grain free of insects to a slight extent.

The houses are built on the ground level, not on piles, but boys watching the crops have a scaffolding so that they can see over the grain.

Building.—I am told that anyone is free to build or farm where he likes on unoccupied land, provided that the spirits agree. The father chooses the site of the son's house and places stones in circles or threes for the granaries to rest upon. The blood of a fowl is spilt as an offering to the people already buried there (or near) so that they may leave the house in peace; and then a few leaves of the *nok* tree are put in a hole in the spot chosen and covered over. This is supposed to bring good luck to the house. After that the prospective owner invites all the "big men" to inspect it, and of course provides beer (*akann*), without which nothing is done. A little is poured three times on the place after three incantations, and an ancestor's aid is invoked, the rest being served out to the company.

When they have drunk all they can get, they tell him to remain in peace, and he starts building. When the house is completed, *tuk* (evening meal) is prepared (on this occasion I am told no beer is drunk), and the quarter is invited to share in the feast, and when all have eaten and departed the family enters.

No sacrifices are made when building (except for the fowl killed as above), or when felling trees, nor are any charms, tokens, or coins put in the foundations. While on the subject I may mention that in Angwom (Ninzam) I saw a rooster put into a pot which was let into a hole in the step of the outer porch, the neck of the pot being narrow, only his head could protrude (Plate XIX, Fig. 23). Fowls are often kept in pots for fattening purposes, but in this position the rooster acted as a watchdog as well, for no one could pass into the house without disturbing him.

A man is free to farm on unoccupied ground, but he must obtain the consent of the spirits (elders) as above, and, if successful, the *meakwap* will sometimes cut the first sod. Beer is given, not a fowl, but a fowl is killed when the corn is ripening, a hole is dug in the centre of the farm, and the blood of a fowl and leaves of the *narrankwoi* and *tongwai* are put in it, the flesh being eaten. When the corn is ready for harvesting, fires are lighted of *kungut*, and the smoke enters everywhere and kills the insects (*zu* or *chichau*). After the corn has been stored in the granary another fowl is killed, and the blood is smeared on the outside, the flesh being eaten by the men. Young women must not eat fowl "as their lips are pierced"—the old ones may, apparently. The blood has the same effect as the beer, it appeases the appetites of the ghosts, who will then allow the people to live in peace—until, of course, they are thirsty again.

The roofs are made of bamboos or palm fronds in the shape of a dome. They are not regular though, for the poles from the top to the front of the house are much longer than those to the back, the apex being over the granary (*abak*). The poles are lashed together with tie-tie, and look like a spider's web, as the lashings are in concentric circles. The grass stalks (*ayiyo*), about 5 to 6 feet long, are then joined together into a flat layer with tie-tie (*ayuwon*) and rolled on to the poles, beginning at the bottom of the front and going first from side to side and then round and round the house until the top is reached, where the knob is tied, and may have two sticks thrust through horizontally, and a large egg or bottle on top as a charm. Each roll of grass is tied to the cross lashings and joined to the next roll.

Fig. 24 shews the ground plan, Fig. 25 the walls and granary built, and Fig. 26 the same with the roof poles in position ready for the grass to be laid on :—1, shews the position of the verandah (not in all houses); 2, the porch; 3, the sleeping apartments; 4, the store-room; 5, legs or stones of granary; 6, the body of granary (the same shape as those built outside and separately); 7, hole to attic (the dividing wall goes right up to the roof); 8, mouth of granary.

When building the house, the granary is first made—so that it may get the sun, and because it will take longer than the walls, being higher—and then the rest of the house. Outside granaries are sometimes built as well, and small round huts for goats.

The floors are trampled until hard, and sometimes charcoal is mixed with the earth (as also with the walls) to blacken it. Cowries are often inserted as ornaments and arranged in circles or "dice-box" patterns. Sometimes even the whole compound has a beaten floor.

Decoration.—The outer front wall of the house is usually decorated, even if the ornamentation go no further than a coat of red earth, and in some towns designs are worked out. Usually the Kajji houses are far ahead of those of the Kagoro and Moroa, so far as skill in building and the excellence of the roofs is concerned. The designs I have noticed are: Fig. 28 in black, or else hollowed out, on each side of the central door. A development of this is shown in Figs. 29 and 30, and a representation of the front of a Mersa house can be seen in Fig. 27. In this last, the doorway itself is also ornamented by lines running around the space, and there are two windows. All the lines in Figs. 27 and 30 are made by pressing sticks (straight or bent as required) into the soft mud when the house is being built. The shaded parts are coloured red in the originals.

The porch generally has a long, trough-like shelf of mud running over the inner door (= the hat rack), and the inner rooms may also be furnished thus. This is to place the calabashes in. Sticks or horns may be stuck in the wall to hang bow and arrows, etc., on, and I have also seen a hanging hook of wood something like a swizzle-stick or an umbrella frame upside down. These are simply cut from the fork of a small tree, and are not improved in any way.

Low wooden stools (*abibya*) are used in the houses. Skulls of men, also those of the hartebeeste, antelope, and monkey are strung on a piece of native rope and hung up on the outside walls under the thatch to advertise the family's prowess, and are passed on as family trophies. There are some medicine houses (although this is denied), but I could get no information about them from the Kagoro, and no alien was allowed to go near; a cave containing a large number of skulls was found by the first expedition. The Moroa have a house at Béniki, and it is said that there are others.

There is very little refuse. The ashes are put in the goat house, the remains of the night's food are usually eaten next morning, or given to the dogs or vultures, while any loose grain is soon picked up by the fowls and goats. Pits (*ubwong*) are, however, necessarily made when the house walls are being built, and whatever refuse there may be undisposed of is thrown in. The Kajji compounds are kept very clean, the Moroa (particularly) and Kagoro housewives are not very praiseworthy, and as the people ease themselves in the fields adjoining the air is not always so pure as it might be.

Reoccupation.—A house is reoccupied on the death of the owner, if he be a Kagoro, not if a Kajji, although he may be buried in the porch itself. If the owner has children—and this seems to include the owner of the house (a wife) as well as the owner of the whole compound (the husband)—he or she is always buried close to the porch; if none, outside close to the walls, so that the roof will protect the grave. As stated before, the Kagoro towns are all, except the five

in the south, at the base of the mountain spur, so as to give a retreat. Caves up above are filled with grain, and in case of alarm are inhabited. Most of the Kagoro compounds are surrounded by cactus (*ajuk*), "the juice of which will blind anyone if it gets into his eyes"—goat's milk is said to be the only remedy, and it must be applied at once—and if the people retire they let loose swarms of bees (*shoi*), which are even more effective than their arrows for repelling assaults.

V. SPIRITS—MAGIC—CIRCUMCISION—INITIATION.

Spirits.—This is, I suppose, always a difficult subject on which to obtain information, and it was not until the Kagoro had known me some months that they would answer my questions.

The Kagoro believe in a Supreme God (*Gwaza*), who seems to be the same as the Universe—at least the names are identical. He is a beneficent spirit and helps the people against the ghosts of their dead. Some say that there is punishment after death for evil deeds not expiated during lifetime, but the majority told me that he who has the strongest arm on earth will be the more powerful spirit after life, and I cannot help thinking that the other idea is a syncretism from the Mohammedans, for there is no hell, and the giving of a feast of *akann* will expiate any crime. All human beings have souls or shadows (*twiwani*), which leave their bodies during sleep. They seem to be connected also with the breath, but how they could leave the bodies of sleeping—and still breathing—persons my informants were unable to explain. The Kagoro are doubtful about animals. Some say that since the shadow disappears at death (or rather since they cannot see one) there can be no spirit, others point out that they can appear in dreams. They can see ghosts, however, and many other things which no men can except those who possess the black magic. Plants and inanimate objects have none, the vegetation in the sacred grove is real and, since the spirits live there, there is no need for ghostly trees. The soul always has the form and voice of the body it occupies, and an individual has only one. If a person is likely to die, the soul leaves the body and goes towards the stream, which divides the next world from this. If the ghosts (*mobwoi*) on the other side think it time that the body died, the soul is allowed to cross the stream —by a bridge, Kagoro cannot swim—but if not they drive it back, and the sick person recovers. Sometimes there is a delay, and the soul being without a habitation shrinks when it returns to the body, and so the person, though he recover, will not have the proper use of his brain or of his limbs. The question of the return of the soul is wholly in the hands of the ghosts of the person's ancestors, and no rites are performed by the people on earth because they could make no difference, but if the person who is causing the illness be found, he is treated as explained on the following page. If, however, it be time for the sick person to die, the soul crosses the bridge, and can never return to that particular body, which must die.

The *mobwoi* lead lives of ordinary men. Spirits of enemies will continue fighting until stopped by the Supreme God. The ghosts ride, eat, and hunt as in

life, and are always ready for beer. They may have sexual connections with living persons,[1] but cannot make women pregnant, nor do they act as vampires. They cannot be destroyed. They live in the sacred grove and in the mountains, not in houses, for there are none in the next world. The *first* husband of a woman will be her husband in after life, and will come for her when she is dying; the *first* wife of a man will also come for him, and parents will come for their unmarried children. The spirits are always hungry and thirsty, and unless looked after will soon punish their relatives left alive on earth, but they will first warn them in dreams. The ghosts of men killed in war follow the heads of their bodies and will serve the slayer. A few cases have been known of people having seen the wraiths of their loved ones at the time of death, although at a distance, but this seldom happens.

A spirit may transmigrate into the body of a descendant born afterwards, male or female; in fact, this is common, as is proved by the likeness of children to their parents or grand-parents, and it is lucky, for the ghost has returned, and has no longer any power to frighten the relatives until the new body dies, and it is free again. The new person has no special powers, nor is he treated in a different way from the others. A male soul may enter a female body and *vice versa.* Souls cannot take up their abode in animals nor in inanimate things, but those of beasts can enter into the bodies of children of their slayers, as is shown by the fact that more than one case has been known of a child being born with marks of wounds exactly like those received by his father or mother when fighting with an animal, or by the animal itself, killed before the child's birth.[2] There is no moral reward or punishment in the transmigration of human souls into human bodies, but it would seem from the above as if the soul of an animal could inflict punishment. All souls survive and become ghosts, none can die a second time or be destroyed. Each has only one shape, *i.e.*, that of the body it inhabited during life. If anyone dreams of a dead relative, beer must be made or obtained next day and drunk by all the people of the house and the chief medicine man (see page 168).

There are no other gods nor spirits, *e.g.*, none of rivers, mountains, etc. Apparently, the ancestor is not worshipped in any way, though his ghost is feared, of course, nor are any figures or carvings made that I could hear of. Skulls of enemies only are kept, and the ghosts of these are supposed to serve the slayer, but they are more valuable as trophies of prowess. At the householder's death all the skulls in the house are tied on to a pole, which is then stuck up in the ground. This

[1] Very doubtful.

[2] Very doubtful. Still, there is said to be a general belief in West Africa that "those who kill animals [crocodiles] are supposed to take their form after death," and "in New Guinea and the East Indies crocodiles are frequently respected as being the abodes of souls of ancestors" (*Encyclopædia of Religion and Ethics*), so it is not impossible that I was correctly informed. The belief is more akin, perhaps, to that of some Southern Nigerian people, who think that the souls of living people may be lodged in the bodies of animals, so that any injury done to a beast is felt by the particular human being thus connected with it.—*Vide* FRAZER, *Totemism and Exogamy*, vol. ii, page 593.

ensures that the spirit will be well looked after on its journey, for every householder inherits in some way the benefits from the heads "collected" by his ancestors as well as from those he has himself obtained.

All deaths (*oku*) are due to black magic (*unkut*), so when a person is sick it is necessary to discover who is responsible. An ordinary individual cannot see these evil souls, but a witch-doctor (*tenshi*) can, and is invited to "smell out" the owner (*ayanet*). When people sleep, their souls leave their bodies and wander about; this is proved by (1) dreams (*la*) of conversations with dead ancestors, (2) dreams of one's own wanderings, (3) the fact that if one be awakened suddenly the soul may not have time to get back, and so the person has not the proper use of his faculties at once. Now while the soul is absent it may be caught by that of the evil-wisher, or the latter may beat the victim's soul with a stick. In the former case one knows that the victim's bowels[1] have been removed and taken to the magic cave in the grove, where all the evil-wishers will assemble to eat it. The *tenshi* can see these evil souls because they glow like fire at night—though invisible to ordinary eyes—and he follows them to see where they go. On being summoned, he calls over the names of several persons, and the sick man will recognise the one who is afflicting him. The accused is then caught and shut in a house with a fire in it, into which pepper is thrown, and he is kept there until he agrees to remove his curse. If he "really returns the bowels" the sick man recovers, but he may have only promised to do so to escape from the burning pepper, and may eat the bowels after all, in which case the person dies, and the evil-wisher will then be sold as a slave or choked. If, however, the sick person be very old, the *ayanet* is not punished, for a beer feast will result and so bring enjoyment to all the members of the family. Cases have been known where the *ayanet* gave back the sick person's bowels and allowed him to recover, but took that of a dog or a sheep instead, as is proved by the fact that the animal died soon afterwards of a similar illness.

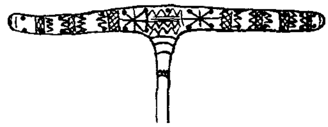
The ghosts are consulted about important events, such as the undertaking of war, the formation of a hunting party, or the building of a house on new ground. In the first two cases the elders visit the grove and drink for some three days, in the third *akann* is poured three times on the ground chosen (see page 152).

There are priests (*tenshi*) but no priestesses, the *meakwap* being the head They get presents, but no regular salaries. They can foretell events, not by haruspication, but by examining a bowl of water into which a little flour has been thrown (see page 171), or by counting *tichiaks* (see page 165). The *meakwap* is much more powerful than the *agwam*. The priests and medicine men do not go into convulsions or trances.

Festivals are held at any time when beer is available, and always at death, puberty, and marriage, though apparently not at birth if the child be born at term and without trouble. There are no human sacrifices, though the presence of the skulls at funerals (see page 166) may be a survival.

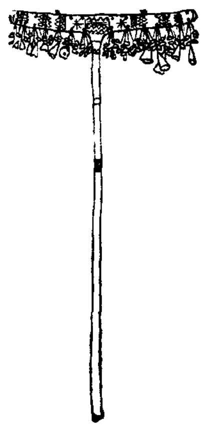
[1] Or liver, I am not quite sure.

Magic.—Generally magic is harmful, and all accused of using it are in danger ; some are "smellers-out," who find out whose spirits go to the bush at night and play with fire ; they glow like fire so the smellers can see them, the bodies remain at home. The ordinary people cannot see the spirits. The medicine man (*anyikan* or *abok*), the evil-wisher (*ayanet*) and the chief priest (*meakwap*) are different. No one will own to having black magic (*unkut*), but every man has some power of the white variety (*wuluwa*) in his own house. The white magic of the house and town are different, the latter is possessed by only the important men and the place for using it is the grove. No instruments (drums, trumpets, etc.) are brought to the grove, but while the big men are there drinking (usually for three days on end) the younger ones will be playing at home. No objects are needed to kill a person, the evil-wisher will catch his spirit. No deaths are due to natural causes whatever the age of the deceased. The priests do not dress themselves up as do the Waiwai (see head-dress, Plate XXII, Fig. 2, No. 19), they merely smear their



HEAD OF WAIWAI MAGIC RATTLE.
BACK VIEW.

WAIWAI MAGIC RATTLE.



WAIWAI MAGIC RATTLE.

faces with red earth and rush about shouting (*boi*) to frighten the women. Neither magic rattles nor squeakers (see Plate XXII, Fig. 2, No. 23) are used, so I am told. Charms for warding off danger exist. If a man be wounded with spear or sword (unpoisoned) and the place refuses to heal, the weapon, if obtainable, is washed with water, which is drunk by the sufferer, and he will recover. Certain herbs will make a girl cleave to her husband. The curse of a very old person is dreaded. The names of individuals are never hidden; an evil-wisher catches the victim's soul and does not work his evil by simply calling his name. There seems to be no reading of the stars.

Circumcision.—All males are circumcised, but not females. Only old (and therefore "big") men perform the operation, then only with a particular knife, and they must be specially appointed. If grown up (say through having been captured) without having had it done, a man might be left, but no case of a man being uncircumcised is known. The foreskin (*pa*) is first measured, then drawn forward and cut off, and is buried with the hair of the head, which is shaved at the

same time. No god-parents are appointed (nor with Hausa). The boy sits over a hole with legs stretched straight out so that the blood drips into it, he sometimes has to be held. He has been named before this. No special ornaments are worn, and there is no special washing. On the day that he heals he is given a new loin covering. The grown-up women are driven away from him, so they will not delay the healing, and he may be put in a place of solitude all day, coming to the house only at night. The healing may last from two weeks to two months, for as the part is not bound up the patient often scratches it, and so makes it worse; he does not do any work during this time. Circumcision would not be done after death, for it can make no difference to the ghost. No uncircumcised man may enter into the ceremonies at burial, etc. Moroa, Kajji, Attakka and Katab all circumcise, *not* Gannawarri nor Kibbo, who wear "cases." The custom is said to be very old, and not copied from the Mohammedans, but to have been got from Nimbia. As conception depends only on God, circumcision makes no difference to marriage, but women would probably object to marry an uncircumcised man. It is unlikely to die out, for most of the surrounding tribes do it, and further contact with Hausa and Filani will give it more of a religious significance.

There is no Phallic cult (Nadu worship the male organ) unless the tail (see page 150) be a survival. The cutting off of the foreskin is supposed to separate the boy from sickness; no part is offered to the Supreme God nor to ghosts. Each town has a special circumciser, he is not the scarifier.

Initiation.—The next ceremony (after circumcision) is the secret one of initiation. When youths are to be initiated (about the age of ten) they are assembled early on a certain morning in the house of the chief priest (*meakwap*) amidst drumming and blowing. Each candidate is then smeared all over with grease, after having been shaved clean. The grown men present—who have been drinking *akann*—then beat them with switches. After this the *meakwap* tells them to keep clear of women until the ceremonies are completed, and they are given switches to beat any females who may come near them. They are then taken to the grove by the men, who all drink in front of the boys, the latter not being allowed to touch any of the *akann*. The boys then go away to the place provided for dancing and dance all night. Next day there is more dancing—but no more beating—and again the men drink. This goes on for seven days, when the boys go back to their houses, but must not speak to a female for another seven days. There seems to be no initiation of females, for they can never enter into any religious ceremonies—except the *laughing* woman in Moroa (see page 167).

Except for the grease there is no special preparation of the body, no dress is worn nor any disguise. The names of the candidates are not changed, and there is no special language taught them. It is said that there are no grades of initiation, but apparently no male is supposed to have become a man in all respects until he has been circumcised and initiated and has taken a head. If human heads have been unobtainable it would appear that those of certain animals—monkey, hartebeeste, and one or two kinds of *bok*—will do. The dancing in the ceremony

is probably a test of endurance, and the beating is to find out if the candidates can bear pain. Food is given to the initiates but no *akann*.

The stages of development to full manhood seem to be (1) circumcision, (2) initiation, (3) scarification, (4) the taking of a head if possible, (5) marriage, and (6) the shaving of the head.

VI. Superstitions—Tabu—Covenants—Ordeals—Customs.

Superstitions.—Folk-tales are told habitually by children, it is said, but I could get only one, and it seemed far too like the Hausa fables to be a local story. It is forbidden ever to talk of ghosts.

The sun is said to fall into the water when it sets, and be put out—it is recognised as fire. It travels back to the east at night by a higher route and gets fresh fire for the following morning from the Supreme God.

I could not get anything *re* the origin of man, but the Kagoro say they have heard of a big flood. The ancient people were wiser than the present but not so strong, they were in no way superhuman, though they were not so wicked as those of to-day. They drew up all the laws. The people forgot how to swim when they learned how to make bridges, and that is why no Kagoro can swim to-day—the bridges are merely palm trees felled so as to fall across the streams, so this does not seem a particularly good reason. It is more likely that this is another sign that the Kagoro came from Bauchi where the level is higher, and where there are fewer and smaller rivers. Houses were invented by combining the advantages of caves and shelters; "that was a long time ago."

Rejoicings are made when the moon (*jwat*) is new, and the Supreme God is asked to give the people health and luck during the coming month. In times of drought He is asked to send rain. There is a special day fixed by the priests for the supplication. They make mystic preparations (and no doubt wait till the clouds are in sight) and rain always comes in a day or two. This shows that the priests are very powerful and can prevail upon God. All the people turn first towards the south (see page 138) when praying, and then towards the other points of the compass. No *akann* is drunk at new moon, but in times of drought some is thrown three times after three incantations on each corner of a special stone about two feet high,[1] which is set up for the occasion in the grove, and is supposed to be inhabited *pro tem.* by the Supreme God. A fowl is first killed, and a little of the blood and feathers are placed on the top of the stone, and perhaps also some flesh, and God is said to eat these and be pleased. This stone is kept for these rites only, and this and the stone or tree mentioned on the next page seem to be the only things approaching idolatry or fetishism.

Nail parings and hair are left about, as no harm can be done to the owner by means of them.

[1] I did not of course see this stone, as it is in the sacred grove.

If any tree or house were set on fire by lightning, all the people would at once quench their fires and hasten to the spot with bundles of grass to get new. To neglect this would show that the person so doing possessed black magic, and did not want to change his fire.[1]

Sneezing and yawning seem to have no particular significance, except that they show that the performer is cold or sleepy, but during *akann* drinking the *meakwap* would, perhaps, be saluted if he sneezed, no others. Heaviness when suddenly aroused from sleep, shows that the soul has not got properly back to the body.

Animals can talk to one another, also birds. Only persons possessing black magic can understand this language, not even the priests.

There does not seem to have been any desertion of houses or towns on account of death or sickness, even if contagious; the Kajji, however, leave a house when the owner (a wife) dies, and other tribes continually desert their villages on account of smallpox. Perhaps the Kagoro are too much pressed for space to be able to do so, and cactus takes a long time to grow high enough to be a protection. I saw no ruined houses. Kagoro wash but little (some never), and most cannot swim, nor have they canoes, so they do not like crossing water if at all deep—say, past their waists; a few have learned to swim in the Kaduna in Moroa. Children are named after special events, thus several girls are called, "Wife of the Whiteman," on account of having been born when a European was in the vicinity. They may also have the names of animals—possibly because it is suspected that the ghost of one has become the child's soul. I could not obtain any particulars *re* omens; it is said that they are not believed in, but this is doubtful.

Tabu.—Women formerly did not eat dogs or fowls, as they were supposed to belong to witchcraft—in which women have no part—and the *tichiak* were said to prevent it, but there is no longer any restriction of any kind imposed upon old women with regard to any food.

I am told all males eat with spoons (see Plate XXII, Fig. 2, No. 20), except when the food is a medicine, but this is very doubtful. The use of spoons is forbidden except to men, so that the father may not hear his women and children eating. Females always eat with the right hand, so they say, the left not being allowed. Kagoro women will call the husband (even the first) by name after a couple of days, Hausa and Filani perhaps never; husbands will also name their wives, fathers will name their children, and men will name themselves. Wives will let husbands see them suckling their children, Hausa and Filani never allow this with the first child on account of the sense of shame that a woman is supposed to feel. Dead persons are named. Names are not changed at initiation. There is, therefore, no magic in them. Women and children are not allowed—under pain of death by stoning—near the sacred grove, or to talk of ghosts; even members of their own family would kill them. In small matters, the head of the house has

[1] This must be very rare. The souls are in some way connected with fire, for they glow at night (see p.160).

power to punish (eating with wrong hand, etc.). In serious events (*e.g.*, women going near the sacred grove) the elders will judge and condemn to death. The *meakwap* has the principal power in all matters of magic; the *agwam* in work, taxation, etc. For war, a special leader is chosen, the *agwam wuta*. Houses in which an unwelcome stranger (but too strong to attack) has slept might be destroyed; this is common, even with the Filani.

Covenants.—When peace is to be made, the important men of each tribe meet at their boundary, each party bringing a he-goat. After talking, each goat is killed (throat cut) and some of the blood is smeared three times, after three incantations, on a tree or stone agreed upon. Each is then divided into halves lengthwise (all except the head, which with the skin goes to the *meakwap* of the town bringing the goat) and one-half is taken by each party. The people then separate, and each will cook and eat its two halves in the bush at some distance apart. When the flesh has been eaten, about three men of each party will be told off to go to the other town, and then all go home; these hostages (?) are sacred. The Moroa do not first cut the throat of the goat (a female) nor skin it, but divide it crosswise while still alive, and give the hinder part to the other people; all eat together and will mix with one another. A broom is constructed by the party which has made the first overtures of peace, and is handed to the other party, the most important man present holding it and swearing that it will sweep out all evildoers. Kagoro also make a broom of *sassak*, a grass used for lighting fires; this is in order that if men of the proposing party attack at night, the grass torch will show where they are. The people summoned by the others take the trophy home. Should the peace be broken by those who have received it, the treachery is not so great as in the contrary case. There is no mixing of human blood when swearing friendship.

When settling questions of boundaries neither side makes any offerings. The big man of each has his say and all agree that if their people enter the lands of the others their crops will not prosper.

Ordeals.—When taking an oath the accused holds some ash in his hand and says if he has done such and such a thing may his body become as white, or else holds a head of corn and says that if he has done such and such a thing when he eats the next corn may it kill him. However long afterwards he may live, the false swearing will be said to be the cause of his death when it does take place. But in serious cases, the pith of the *sap* is pounded and soaked in water, and this is given to the accused, who will first drink water alone, and then the *sap*. He will then go round and round the calabash three times, and if truthful will vomit, if not he will die that day. Sometimes the throat is tickled with a long feather, and if he vomits then he is let off, but in Ayu he is sold, and in Ninzam perhaps killed all the same. A powerful man may have a fowl as his deputy to drink the potion (also in Ayu and Ninzam).[1] I am told that if salt be mixed with the *sap* it is very

[1] Dr. Barth says that the Marghi used to decide suits by means of cocks which fought as the champions of the interested parties. The Hausa have used rams for somewhat similar purposes. *Vide* my *Hausa Superstitions and Customs* (John Bale, Sons, and Danielson).

poisonous, otherwise not, and so the *meakwap* has a little under his finger nails. He gives the one whom he wishes to be thought guilty the drink last of all, but before doing so he takes care that the salt—enough now that the contents are much reduced—mixes, and the drink is sufficiently poisonous for his purpose. The *meakwap*—not the *agwam*—will swear them. There is no redress for non-fulfilment of a promise.

A lot of lip *tichiak* are threaded on a string, and kept by the *abok* (medicine man). On a sick person asking if he will recover, the *abok* will examine his *tichiak*, and will tell the patient if he will recover or not, or else he will look in a bowl of flour and water (see page 171).

Customs.—Formerly there were hardly any salutations, sons and wives abused or ignored their fathers and husbands if stronger. There is no bowing, though some have learned the prostration on the ground and touching heads with hands from Kafanchan. The *meakwap* is saluted only during beer-drinking. A stranger may be saluted by the women of the house in the morning, but not a husband. "Every man is a chief in his own house," so the Kagoro say, but in contradiction of the above I always found the woman and children at any rate quite polite, and the *Agwam* of Fada Kagoro, when he went to Keffi with me (and everyone thought he had been killed, as he had been away for seven days), was met by all the people of his town with shouting, drumming and blowing of horns on his return.

It is no shame to ease oneself in front of people of the same town. All children indulge in coarse conversation.

VII. DEATH AND BURIAL.

When a death occurs, the women related to the deceased assemble and cry for the rest of the day—or if at night, till morning—and horns are blown. The people collect and the corpse is wrapped in a new mat of plaited palm leaves kept for the purpose; it is not preserved in any way, nor is any coffin used. If the disease was infectious the mat that the deceased had been lying on would be thrown away, but not otherwise.

A grave having somewhat the shape of a liqueur bottle (Plate XIX, Fig. 31) is then dug in the compound, the mouth *a—a* being about 3 feet in diameter and 6 inches deep, it then narrows, *b—b* to 2 feet for the next foot in depth. Underneath, it is made about 6 feet long[1] *c—c* (and 6 to 8 feet deep *d—d*), but only 2 or 3 feet wide. The women and children are all driven indoors and the most important men present then carry the corpse to the grave amidst shouting, blowing, and drumming. The chief priest (*meakwap*) wishes the soul well on its way to the spirit-world, and hopes that the deceased's relatives will keep well—possibly a hint to the spirit not

[1] The only grave I actually saw was a Kajji one. I was told that those of the Kagoro were exactly the same, but I cannot help thinking that if the corpse is to lean against the walls the grave would be very much less than 6 feet in length. Others have told me that all Kagoro lie down, males on their right sides, females on their left, so the above type is probably used by most of the Kagoro.

to worry them. Two men then enter the grave and the corpse is lowered in, feet first, and made to recline against one of the sides, with its face towards the sacred grove. With the Kajji the corpse lies on the ground with its head (face upwards), if a male, towards the east; if a female, towards the west. The two men then climb out, and sticks are placed over the mouth (*a*—*a*) and plastered with clay, or, as with the Kajji, a round stone is found to fit the cavity, and the excavated earth is heaped on top—none is placed in the grave with the corpse, nor are any arms or food.

If the deceased has been an important person or a parent, a goat will be killed; if unimportant, a fowl; if a baby, nothing. Branches of the *sham* and *lunn* trees are intertwined and placed on the grave. The flesh of the goat or fowl is then divided amongst all the relatives present, who are always summoned; to forget them would be a deadly insult. "Meat is a message which must not be ignored." The men cook and eat it on the spot, but women and children do not go to the grave. A pole will be set up to which are hung all the skulls belonging to the family. Formerly, if the deceased had been an important person, people were killed on the day of the funeral so that their ghosts might accompany his, and their skulls were left on the grave until the flesh was gone, and then added to the other trophies of the family. The shovels with which the grave has been dug will not be taken into the house until after the final feast is finished. There is no difference in the procedure now between the burial of a chief and that of any other person, except that the family of the latter might have no skulls to exhibit, but a stone may be placed on the grave of an important man.

At the expiration of seven days the relatives living in the deceased's quarter make *akann*, and this is drunk four days afterwards by the adult males, the feast lasting perhaps three days; *akann* feasts nearly always last three days, there is some magic in the number. A pot of *akann* is first brought to the grave—on which fresh branches of the *sham* and *lunn* trees have been placed—and the most important man present dips a calabash into the pot and pours a little *akann* on the grave round the branches, saying mystic words. This is done three times, the rest of the people sitting around in a circle; then a goat (or one to three fowls) is killed, the blood is poured over the branches, and the flesh is roasted close by. A kind of porridge (*tuk*, see page 176) is then brought and eaten, together with the meat, and the rest of the *akann* is drunk. After this is finished all go to their houses, and then the adult males go to the grove and drink what has been prepared by the family; women and children have some, too, but must drink it in their own houses. Drumming and blowing of horns is kept up as long as the beer lasts.

With the Moroa, on the death of a chief, his son (heir if no son) must provide a mare which is led around the feast by a *laughing* woman, who is dressed up for the occasion, and the mare is afterwards sold; if not, she will die. It is absolutely necessary that a mare be obtained for the funeral; should the heir neglect this the father's ghost will never let him alone. A chief's feast will continue for perhaps seven days, that of ordinary people three.

Both sexes paint a black stripe from forehead to navel about 1 inch wide (see page 140). The women will probably cover their whole bodies with red earth, the men their legs from the knees downwards. On the seventh day after death all the deceased's household, except the wives, shave their heads. The women are always shaved, so the wives now leave their hair as a sign of mourning for a month—or until married again, if that be sooner—they also remove their tails. A fresh grave is dug for each corpse, but there is no objection to burying a body in a very old grave; no offerings of any kind are placed in it. I am told that the Aragga (a tribe to the south) smear the corpse of a chief with grease, and keep it near a fire for about a month. It is then buried, together with the favourite wife, a child and three attendants, who have been killed for the purpose, also the chief's horse and one-half of his clothes and other possessions.[1] The Kagoro probably did something like this once; at any rate, they killed slaves or strangers. It is said that *acha* flour and water will be poured over the graves of important men at the next harvest, so that the ghosts may not be hungry; but this is done only once. There will be an *akann* feast at the first harvest after the death, or if that be too soon, at the first after the anniversary.

The object of the libations of *akann* and blood (eaten by the Kagoro, see page 177) is that the deceased may not get hungry or thirsty, and come back to harass his relatives. A ghost cannot worry anyone but his own people, it therefore differs from the soul of a living body. It is hard to say if the ghost is supposed to take the actual food offered on the grave or its essence; if the former he is evidently supposed to be easily satisfied, since he is given such a little—the Kagoro does not believe in giving him more than can be helped—but then ghosts get their own food as in life. Afterwards, if anyone of the household dreams of the deceased (the ghost resembles the body), *akann* must be prepared, for it shows that he is thirsty, and if neglected would soon bring trouble upon his relatives. The *akann* must be procured next morning; if there be none in the house it must be bought elsewhere and drunk at once, some being poured on the grave three times as before, but no flesh is provided nor are the branches again placed on the grave. The principal man present asks the ghost while pouring out the *akann* how he is, and when he has finished he asks the Supreme God not to let trouble come on the family. There is no other way of getting rid of the ghost, beating, shutting up, etc.

Dreams of animals are not feared, if therefore they have ghosts they are evidently not malignant, and no *akann* is necessary to appease them, for they can do no harm to human beings. A thirsty man no doubt has many visions, and—needless to say—he dreams of dead men, not animals!

If it should be impossible to bury the deceased in the ordinary way—through having been eaten by wild beasts or carried away in a river—the ghost will still be able to go to the grove if the beer feast is held.

[1] The Hausa used to keep the bodies of their dead chiefs over a fire until the successor had been chosen; other tribes used to kill a male and female slave and a horse and bury them with the chief. Vide *Hausa Superstitions and Customs.*

All ghosts go to the same place when they leave their bodies, whether chief or poor man, whether good or bad. No charms are worn to keep them away, so far as I know.

The principal persons at these rites are always the priests (*tenshi*) and they may be the only ones present not related to the deceased. They have no power over the fate of the ghosts so far as sending them to another place is concerned, for there is only one place—the grove—and all spirits go there, but they are more powerful with the Supreme God and with the souls of people before death; they can, apparently, summon ghosts for a conference on important events, war, peace, etc. Priests are usually trained by their fathers, the secrets being kept in the family. What these secrets are I could not find out, but there seem to be no sleight of hand, mysterious noises, etc., which they can produce better than any other man. Women and children are not allowed to leave their houses at night for fear of the ghosts, nor can they ever go to the grove. There are no priestesses.

VIII. Preparations—Menstruation—Courtship—Marriage—Divorce—Adultery, etc.

Preparations.—The Kagoro and Moroa girls marry later than the Kajji, whose brides can hardly average ten years of age. There is, however, no age limit, for no one counts the number of years he or she has lived, and even seasons are not noted for the purpose of reckoning ages, though the seed-time, harvest, etc., are, of course, known. With a Kagoro or Moroa girl the menstruation first appears and the mammæ develop, and after that the marriage will be soon or late according to the needs of the girl's father. With a boy, the test seems to be whether he can get an erection or not, but, of course, he must also produce the necessary presents—or his father for him; he would be from sixteen to eighteen years of age. Some say that both boys and girls are taught what to do, but this is extremely doubtful, and at any rate there is very little actual connection before marriage even between betrothed couples, and the girdle of string (*ivyan*) worn by girls *is* a sign of virginity. Of course "there is a thief in every town," and should an unmarried girl conceive she is taken to the lover's house by *an old man* of her family, and the lover is forced to marry her; she would, however, probably have tried medicines beforehand. There are no operations except circumcision on the male organs, none at all on the female.

Menstruation (*ambwakassok*).—This occurs about the age of eleven or twelve, apparently, and on the first appearance the girl is scarified on her chest and back—the navel being done when the child is small—to signify that she is ready to be wed. The Kajji, I believe, scarify when the girl is married, and do not wait for menstruation. There seem to be no superstitions connected with the early or late appearance of the flow; in fact, very little attention seems to be paid to it at all, as there is no subsequent purification except an ordinary washing, and women will sleep with their husbands on the night of its cessation.

Courtship.—When a man goes to propose he takes a sum of cowries, 4,000 to 10,000, which he gives to the girl's father. His father or guardian will probably act for him if young and not previously married. If his suit be accepted he adds one hoe, one goat, one dog, and the flesh of another goat to be eaten at once.[1]

The girl has a right of veto though not exactly of choice, as the father's fee must be paid before she is supposed to know that she is being sought. A father will, therefore, sometimes accept presents secretly from several suitors, and after he has spent the money, simply tell them that his daughter—or ward—will not marry them. As the father cannot—or will not—repay the money, the unsuccessful suitors will, if possible, catch him when out hunting or farming and tie him up. If when once caught he cannot raise the money, he may be sold as a slave, at least, so they say, but as no one but a Hausa or a Filani stranger would buy a slave in his own country, considering that no one could recapture him if he escaped. If, however, the father stays at home he will probably be quite safe, for poisoned arrows are fairly efficacious for keeping unwelcome visitors at a distance. The suitor wears a long iron chain, if he has one, around his neck.

Marriage.—However, when a suitor has been accepted and has paid up in full, a great amount of beer (*akann*) is prepared by *his* people, and on the wedding day is taken to the house of the bride's father, where the feasting and dancing are held. These festivities may go on for any number of days up to ten, but seldom for more than three—in fact, until the *akann* gives out—and both bridegroom and bride partake. The girl does not mind her mother seeing her the day after the wedding. The mother-in-law will give the bridegroom a bowl of beans and some porridge, but there does not seem to be any food provided for anyone else, only the beer.

Marriages of virgins take place only during the wet season, after seed time, about June to August. On the first day of the dancing the bride is taken to the bridegroom's house by her mother (who gets perhaps 2,000 cowries or a hoe for her trouble) and by his female relatives, and is allowed to talk for a little while. She is then taken back to her father's house, but in the evening the bridegroom follows and sleeps with her; the next day she again visits him and remains.[2] At the end of the millet farming the bride is given a tail and she hangs leaves in front, the signs of marriage. The husband then kills a dog and eats the head, liver, entrails, and legs, those who have helped him in his quest for his bride get the throat (because they have used theirs—*i.e.*, talked—in his service)[3] and the girl's father has the remainder; the girl herself has nothing. The marriage is now complete, and the last scarification—lines on the forehead—is done. If the wife be satisfactory, the husband will probably give her mother another present.

[1] The amounts given me vary slightly, so it is evident that the presents to a certain extent depend upon the wealth of the suitor and the position of the bride's father, which is natural.

[2] Some deny this and say that the husband does not go near his bride till the seventh day. The above is, however, correct, I think.

[3] This seemed very unlikely, but I fancy the Kagoros are too much lacking in imagination to invent the story for my benefit, so it is very likely true.

Widows and divorcées can marry at any time of the year; the procedure is the same except that the wife at once lives with her husband. The marriage of seduced girls has already been mentioned. In their case there are no presents, and no dancing nor drinking takes place. The first wife is the chief and looks after the others. She may hit them, but should they retaliate, their parents must give her *akann*.

Divorce.—When the girl is once married she will seldom leave her husband of her own free will, except on account of cruelty or impotence. If she does, the husband will take another dog to her father and ask him to persuade her to return. However, although the woman may be quite satisfied, her father may not be, and he often makes her leave, so that he may get more presents either from another man, who wants the woman and has paid the father, or else from the husband to get her to return. If she be given to another, the former husband has no power over her, and is supposed to bear his supplanter no malice, but he may try to persuade her to run away and come back to him. This is seldom done, for the women are always subject to the authority of their fathers or guardians, and to be divorced and given in marriage again by them is quite legal and moral, while to run away would be to commit adultery. If this fails, he, perhaps, tries to take her by force, if on her farm or alone, or else to give her father a bigger present than his rival has done, and so get her back legally.

As I have said, rival husbands are supposed to feel no animosity. There is however, a belief—and probably a well-grounded one—that if they meet during a raid or a hunting expedition one of them (usually, if not always, the supplanter) "will be hurt by an arrow and die." As every man has his special mark on his arrows, and the arrow which kills the rival is unmarked, the death is put down to magic; but is it not possible that on this particular occasion the ex-husband forgets to mark his arrow? This seems to apply only when one has taken the wife of another Kagoro; there is no bad luck even in capturing and keeping the wife of a man of a different tribe.

Adultery, etc.—It is said that there is practically no adultery—the change of husbands with the woman's father's consent being legal—but if a husband were to find a man with his wife he would beat him, and perhaps her also. If they were found in the husband's house he could kill the man, but wives are never killed, for they are, in a way, property. Gonorrhœa is said sometimes to result from a too frequent change of husbands; it comes more likely through want of washing. Syphilis is unknown, as there is hardly any intermixture with even Hausa. The Kagoro prefer their own or Attakka women to Kajji, Moroa and Katab, because they clear the grass (*sham akwap*) for farms, and those of the latter tribes will not. There seems to be no idea that mixtures of tribes will affect the birth-rate; no difference is made in the treatment of children by wives of different tribes. Sterility is very uncommon, as is lack of virility in men. There are medicines for producing abortions, but no aphrodisiacs, it is said, except the kola nut which is being introduced by Hausa and Filani, but it is too dear, at five for 3*d.*, for

most Kagoro. The medicines would be used by unmarried girls or by women who have borne several dead babies; usually children are very much desired, and the parents are very good to them. There are no prostitutes. Women are not allowed out of their houses at night for fear of ghosts (see page 160), and this, no doubt, is a great check to immorality. As maids *are* maids in nearly every case, there are but very few bastards, if any.

IX. PREGNANCY—CHILDBIRTH—THE UMBILICUS—STILL-BORN CHILDREN—LACTATION—GENERAL.

Pregnancy.—After marriage a woman naturally looks for signs of pregnancy. If the breasts and navel swell she knows she has conceived (*ekwyam afa*), but if in doubt she will go to the medicine man (*abwok*). He fills a calabash with water, throws in a little ground *acha*, and then washes his eyes with some magic drug and by looking in the water can tell what is to happen. A fowl, and a little grain (about 100 cowries in value) are given to him then, and, some time after the child has been born, about 4,000 cowries and some beans are added, and he is invited to an *akann* feast. If, however, the flow should recommence the woman will get a charm from him and try again.

Wives separate from their husbands about four to seven months after pregnancy, the time depending on the number of wives the husband has, and the woman's own desires. No special food is taken, except that a white earth may be used as a charm to ensure easy delivery, nor are any particular preparations made, except that wood may be stored up for fires in the house,[1] but the mother usually increases the amount of her food after delivery.

As a Kagoro woman very seldom sleeps away from her home her children are nearly always born there; the husband would very seldom allow his wife to go to her father's house, for if he did the father-in-law would probably keep the child and marry the woman to someone else when possible. But it may happen (very often with the Hausa) that one is born on the road, and if so, it will be put into a calabash or on the *Kwango* (a wooden tray for firewood), covered with leaves, and be carried by the mother on her head.

Childbirth.—There are no children born before marriage; the great majority of the girls are virtuous, those who are not would take medicines to produce a miscarriage, or else the seducers would be made to marry them. The following is a description of a birth which I got the blacksmith's wife to watch for me. The woman, Na Gode (a Hausa name, but a Kagoro woman), made the breakfast about 7 a.m. and was delivered about 10 a.m. She had but little pain. She sat upon a wooden tray (see Plate XXII, Fig. 2, No. 17) with her knees drawn up and her back to the wall. The daughter came out head first and fell to the ground. Na Gode did not grasp her hips, everything came quite easily and there was not

[1] Mainly to avoid having to collect more when in a weak state, but there may be some religious element also.

much blood. Arikia (the witness) called in four more women to help. One went to get *tchwunn*[1] ashes, and another to get chaff, which was sprinkled on the floor to cover the blood. The child was born in the caul, which one of the women cut, and also the cord. When the child was free, its cord was cut about 3 inches from its body. The bleeding was stopped by putting *tchwunn* ash on the stump, it was not tied. The child was then washed in warm water, and the mother washed her mammæ in some, but not her private parts. At sunset she washed her whole body. She lay down all day but prepared her own food in the evening, but no one else's, for men will not eat anything cooked by a woman while she is "unclean," this period lasting for six days.[2] The child was named on being born. The caul and placenta were buried close to the door of the house, the latter came down directly after the child, but the bleeding continued for two days. She did not cry on being delivered. She had no special food. No men were present. The child was named at once[3] and its head was massaged.

Twins (*ashai*) are said to be very lucky, but triplets are not known.

The Umbilicus.—The part of the cord left on the child is washed and sucked continually until it atrophies and comes off, the time being variously given at between three and fourteen days. It is then (1) burnt, when the ashes are put into a pot of grease and rubbed on the child's head to make it hard; (2) ground and eaten with yam; or (3) planted at the roots of yams, which ensures a very good harvest the following year. Kagoro hardly ever have yams, so the last two seem doubtful. At any rate the cord is supposed to have some special strengthening properties.

The Moroa bury the placenta and cord. The stump is treated thus: the mother fills her mouth with warm water (having first removed her *tichiak*) and sucks the stump, which comes off about the seventh day. It is then placed in grease and left for some ten days. When the child's wound is quite healed, this stump is planted amongst the roots of a yam and the yam will bear a great deal next season. If no yams, the stump is buried anywhere.

Still-born children.—If the child be still-born, cold water is thrown on the face, and shovels, hoes, etc., are beaten in the vicinity to make it hear. If there be no signs of life within half an hour the body is buried.

Sometimes labour is very difficult, lasting perhaps three days, and then probably both the mother and child die. If the birth be very difficult or delayed a medicine-man will be called in. He will shade his eyes, so as not to see the woman's face, and insert his hand—no instruments are used.

No attempt is made to deliver the child if the mother die before having been delivered.

[1] *Tchwunn* is a short grass which gives an edible grain tasting something like patent groats, I do not know the English name, *atcha* is the Hausa. It makes a very good porridge.

[2] Compare the European belief that the touch of a menstruating woman will turn meat bad.

[3] Some say children are given their names by the fathers on the second day, others that the time may be five days and that *akann* is drunk if available. Others again say that a child is named the day that the umbilical stump falls off. For choosing of names see pp. 164 and 185.

Lactation.—If the child lives the mother will suckle it for two to three years, Moroa even up to five years (again depending on mutual arrangement), and during this time she will not have connection with her husband for fear of injuring it. If, however, she did lapse and conceive again within this time she would at once wean her child. If the child be still-born three months is the limit, but if born alive and it die afterwards, the mother may go to her husband within a week. There does not seem to be any hard-and-fast rule, the time is determined by the desires of the man and his wife. Should the mother die and the child live, it will be suckled by some female relative. There is apparently no artificial feeding, and as women continue lactation so long there is never any difficulty in finding a wet nurse. For infanticide see p. 146. Children are carried on their mothers' backs, and if only for a little while, they can hang on without much assistance. If to be there for any length of time, the baby is put into a sail-like half-bag made of string or leather, one end of which is tied around the mother's waist, the other around her neck, so that the child's body to the neck is inside the covering, while a leg sticks out on either side.

General.—The number of births per woman seems impossible to estimate owing to the frequent change of husbands,[1] but probably four to five is the maximum. I have several times been asked for medicine or charms for child-birth.

The greatest number of wives to one husband is said to have been six, but there is no limit laid down; a man may have as many as he can pay for. The people are increasing and will do so more and more rapidly with the cessation of fighting and the gradual increase of the area under cultivation; youths and girls are now marrying at an earlier age than they were five years ago. Owing to my having made the Kagoro and Kajji swear friendship in June (1909) the area under cultivation will probably be constantly increasing. There is, I think, no difference in the size of the families of the chiefs and those of other men, for the possessions of all are about equal (the chiefs having but little power) and everyone wants children. A father never loses his authority over his daughter, and can force her to leave her husband whenever he wants more presents. I have given the tribes notice (Kajji first, as being the most amenable) that in future the father will receive a marriage present only on the first occasion, and that he will have to return it if he persuades his daughter to run away. The father inherits his daughter's children unless the husband or another pays him a fee. This also is to be abolished, but the wife is to get half of what her father would have got as an incentive for her to keep faithful, and no man other than the father will have any claim to the child. Formerly a man could take his daughter's children and hand them over to the Kajurawa (see p. 140) if it was his turn to provide the slaves. The chiefs I questioned were ready to agree to the changes, for though they are themselves fathers they are also husbands, and so would be no worse off so far as actual

[1] I could not get any Kagoro women to talk or be measured, those who were photographed ran away the same night. Probably I was supposed to be possessed of great magical powers, and women have no part in such affairs, as mentioned before.

money is concerned, and very much better as regards the well-being of their families.[1] All their quarrels are over women or drink.

X. Mourning—Slavery.

Mourning.—A widow will mourn from ten to sixty days. She does not wear the tail during this time, but keeps the leaves, she plasters on red earth and grease, and will let her hair grow. Mourning is ended with a feast of *akann.* If the widow has a grown-up son who can afford a feast she may wait two months in his house until the feast is held, but if she have no grown-up sons and no beer she may take another husband in about ten days' time.

Posthumous children are treated as if born before their father's death.

Slavery.—There are no slaves now, though they were caught—but not bought—formerly. If the captive was spared at the time he (or she) would be taken to the house and fed, after that he would not be killed, but would probably be sold. If a debtor be unable to pay, the creditor will try to seize him or a son, who must remain with and farm for him for four years. After that he is free and the debt is extinguished, whatever it may be. The father may pay in the meantime, and so release his son, but very often he prefers this way out of the difficulty. Before 1807 (?) the Kagoro paid tribute to the Kajurawa (never to the Filani, see page 140), and then the heads of the families gave a child in rotation. The captor would have power of life and death over a captive at first, but if he did not kill him in the excitement of battle he would hardly do so afterwards, for he would lose the price if he did. Slaves, while they remained in the house, were treated as members of the family; the females might be made use of, but not married, and sooner or later they were taken to Zungon Katab and sold. Adult males were sold at once. Young males were allowed to hunt and to fight against towns other than their own.

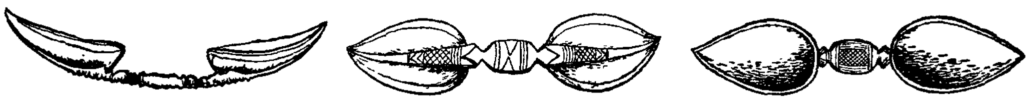
Guests might be entertained, and would be sacred while on the precincts, but could be murdered, robbed, or enslaved on the road next day, without the laws of hospitality being broken. The prices of slaves were—young man, 20,000 cowries; virgin, 16,000; old man, 10,000; old woman, 8,000. The value of a horse was from 50,000 to 100,000 cowries. A bull might bring 20,000. Of course, specially good slaves might bring more than 20,000.[2] A horse might be worth ten slaves, and not only amongst these peoples, for the value was often quoted by Hausa in numbers of human beings. The price for a bull (about 10*s.* there) seems much too little, but it must be remembered that the Kagoro were very poor, and a bull was of use only for a feast. Horses were very seldom bought, slaves never.

[1] This was in 1909. As I did not return to the country, I do not know if these changes were made or not, but conditions must be greatly altered now owing to the spread of the tin-mining industry.

[2] For the value of cowries see *The Niger and the West Sudan* (Hodder and Stoughton), p. 29.

XI. FOOD—DRINK—TOBACCO.

Food.—The principal articles of food are maize (*shwapa*), millet (*zuk*), guinea-corn (*furak*), *acha* (*tchwunn*), and beans (*dijoktedda* and *dijok-tchwunn*); the seeds of the latter variety when sown being mixed with red earth; yams (*chi*), sweet-potatoes (*dankali*[1] or *lawur*), okroes (*kusad*), manihot (*rogo*),[1] tomato (*gaisho*), onions (*agurrima*) and ground nuts (*duchui*), honey (*tong*), palm-oil (*bammiokwann*) and nuts (*kunkup*). Of fruits there are the *pawpaw* (*kambud*), and the edible part



KAGORO WOODEN DOUBLE SPOON.

of the fan-palm (*akurum*) which is something like a mango. Pepper (*shitta*) is grown and sold. Of meats there are the small rat or mouse (*tchwi*) and bat (*akwi*), which are supposed to be very good in soup, fowl (*abwak* and *subnyan*), oxen, if Filani happen to be in the neighbourhood and are not particularly watchful (*nam nyak*), the red cob (*nyo*), although I have never seen one in the district, the dog, and others. The guinea-fowl (*jenn*) and francolin (*zupp*) do not seem to be eaten although they are to be found.

Of fish there are the *funn* (Hausa, *tarwada*), *agbaina* (*tseggi*), *umburronkio* (*karpasshe*). I did not see any of these so do not know their English names. "Fish will not bring leprosy, it is witchcraft."

The grains are all cultivated, no bread is made. If oil be obtainable meat will usually be cooked in it, fowl at any rate. A sort of soup of flour (*zuk* or *furak*) water (*sokwot*), and a bitter herb (*attabwai*) is cooked and may be drunk at any time, but usually in the morning. If none be available, scraps of the previous night's food will be taken. At midday, or after any exertion, water mixed with flour (*susun*) is drunk. After sunset the grain is cooked into a sort of pudding (*tuk*) and may be eaten with meat (*nam*) and soup (*ninyin*). The morning and evening meals are the only ones which are cooked, but, needless to say, the people will eat at other times if food be available. Cooked meat is carried if on a journey, and some flour to make *susun*. One of the objections to much cooking is that the wood is on the plains at some distance from the towns. The changes of diet are due wholly to the foods available. Grain can be stored for three years, so it is said, and be even then quite fit for food.

Salt (*entok* or *atok*) can usually be obtained from Hausa traders, if not, the ash (ditto) of guinea-corn or millet is used. Kola-nuts are being introduced by Hausa, but are very scarce.

The Kagoro do not themselves keep cows, though the land gives very good pasture. When they happen to be quiet, Filani come and easily sell their sour

[1] As Hausa names are used for some of the articles of food it would seem that the Kagoro did not know them before coming to their present land, *vide* page 138.

milk (*abyen*) and butter (*dithio*). The former is also mixed with flour and water and considered a great delicacy. This was evidently learnt from the Filani, as none of the pagans right down to the Kamerun (and probably further) milk cattle.

In times of great famine the roots of a small plant (*tanchang*, Hausa *chakkárra*) are pounded and cooked with ash and water (oil if available). There are a few other similar foods obtainable at such times. One of the principal causes of famine is that the natives use up all their corn for beer. No meat is preserved in any way, all is eaten as soon as possible. The fruit of the fan palm (*akurum*) is stored up for the seed time, but is always somewhat of a delicacy. All the tribes in this district grow the same crops, so their food is necessarily similar. A white earth is sometimes eaten as a charm to ensure easy childbirth, and, as before mentioned, ash is used for salt at times.

Every compound has its own storehouses. Each wife has her own house, and some of the storehouses (*abak*) are built inside. They are built in the shape of vases on three or more stones (or if joined to others, on one stone) as a protection against white ants. All foods except milk and fruits seem to be cooked, and are preferred fresh, though this may be through inability to wait. Meat and fish are boiled with salt (or ash) and a bad-smelling plant (Hausa and Kagoro *dadawam basso*). Fowls are fried with palm-oil or butter. The use of hot stones except as on the next page is unknown. Three stones are used to keep the cooking pots upright—as with the Hausa.

Cooking is done by the women in the yard between the houses—which is always in the shape of an irregular circle, the doors (usually only one to each house) opening towards the centre. Men and women eat their food separately. With men four or more sit around a calabash or two, each dipping in one hand and scooping out a handful in turn. They say they use only the right hand for eating, but this is very doubtful. I found a double spoon in Jigya, but was unable to learn its signification. The women are less sociable. After having given their menfolk their food (eaten in the courtyard except in wet weather) they retire into their houses, and each woman eats with her own daughters and young sons, if she has any, otherwise alone. The ashes of the fires are thrown into the goat or fowl-house, and when sowing time comes are cleaned out together with the droppings, and used as manure (also with Kajji and Moroa).

Flesh of beasts killed with poisoned arrows can apparently be eaten safely, it may cause diarrhœa—but a little of that to a native seems more welcome than not.

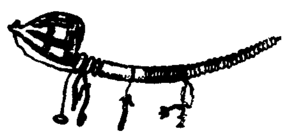
Drink.—The blood (*assok*) of slaughtered beasts is caught in a calabash, cooked with the fat from the region of the stomach, and eaten hot. The Hausa let theirs get cold, and sell it (cut into the shape of loaf sugar) in the markets. The Kagoro, Moroa, Attakka and Kajji have no markets. Honey and millet (Hausa, *buza;* Kagoro same or *akanntong*) is a favourite drink, but one made with guinea-corn (*akann*, Hausa, *gia*) is much more important; the latter enters into

all the festivals and ceremonies—in fact, generally forms the whole feast. Palm-wine (*anchat*) is also appreciated. The method of making the *akann* is as follows:—Guinea-corn is soaked in water for two days, and left for a day. Then the pots are closed with leaves of a bitter[1] tree (*uko*), or of a tree resembling the banana, and left from five to six days. Then the grain is dried in the sun for another five or six days, ground, and put by. When the feasting time is three days off, water is filtered through the flour into a pot and boiled for two days; it is then left to cool for a night and is ready for drinking. Heated stones are dipped in to make it ferment. There seem to be no restrictions on the amount or kind of food eaten by adults and children, or males and females, except with regard to fowls and dogs. Each seems to eat as much as he can get, and when he can get it.

Anchat is obtained from one or other of the palm-trees. An incision is made near the top of the tree, a pot with a narrow neck is placed underneath, and the stream is guided to the pot by a short hollow stick of bamboo. The wine may sometimes be kept a month before being drunk, if the pot be closed up.[2]

To make *akanntong* (lit. beer-honey), water and honey are boiled together and then cooled, then flour is added and stirred well. The mixture is then poured off into pots, which are closed with small calabashes, or other articles, and mud is plastered around to make them air-tight. It is then placed near the fire and warmed for two or three days and is ready for drinking.

The guinea-corn or millet drink (*akann*) is, however, the one used at festivals, such as marriage and death. The "big" men drink first and sit apart from the more humble ones; women drink inside the houses. The mother-in-law gives the bridegroom at the time of the marriage a large calabash of beans, and he and a friend have one meal of *tuk* (Hausa, *tuo*) at her house, but there is no other *eating* —only drinking. At funerals, after a day's mourning, *akann* is given to all present by the deceased's relatives, and *tuk* in addition to the females. Compare the Irish "wake."



NINZAM WOODEN PIPE.

KAGORO IRON PIPE.

Tobacco.—Hausa introduced tobacco as the name shows (*taba* in both languages), but now a little is grown by the Kagoro themselves. It is smoked with ash of *acha* (*kuthuwok*) or potash (*mvnndi*). Pipes (*lan taba*) are made of wood or metal, the former they make, the latter are bought from Katab people

[1] Others say that the leaves are not bitter but sweet, and this seems more likely.

[2] I very much doubt if grain is ever kept for even one year or palm-wine for one week.

or traders, or from the foreign blacksmiths in their towns. A greater quantity of tobacco is said to be smoked at beer feasts, but as each brings his own this is doubtful. There are no rites apparently. Tobacco is also snuffed ; it is said to be a remedy for headache.

KAGORO WOODEN PIPE—CLAY BOWL.

JABA WOODEN PIPE.

Pipes are passed from mouth to mouth ; none are known with more than one stem, but *jaba,* long wooden pipes, have two legs to rest on the ground. I should not think smoking was indulged in sufficiently to have any bad effects.

XII. Diseases—Various.

Diseases.—Smallpox (*banyup*) is a scourge in many native cities, though it should not have the same chance to spread in Kagoro towns where the compounds are separated by cactus hedges and fields, as it has in Hausa cities where the houses all adjoin one another. The Kagoro are very much afraid of the disease, and will not go near anyone of another house who has it. In any case they intermix very little, and it is at only a few of the towns that traders are respected, so they manage to keep pretty clear of infection.

Sleeping sickness is said to be recognised, and to have a name (*akainda*). There are no medicines for it, and the cause is not known.

Leprosy (*apwurrumbwak*) has been observed; it is not supposed to be hereditary nor to come from a fish diet. Tagamma, the interpreter who had it, said that his elder brother by the same mother was also diseased, but was not sure if any of his mother's people were, as they were Kajji. Leaves of different trees are used to make drinks or washes.

Various.—All dreams (*ellert*) and deaths (*oku*) are due to witchcraft (*unkut*). Persons who have magical powers can see the diseases walking about, and they call them to their service.

There are no bones carried as charms or ornaments. Patients are nursed by their relatives. No sanitary precautions are taken, but the houses are well apart, so there is not much danger of diseases spreading. Drinks and washes are made.

Directly a tornado comes the natives start sneezing and spitting, and will get to a fire if possible. Rain seems to make them heavy and stupid. Fires are lit in the houses at night and even during the day in the cold season.

Broken bones.—Splints (*ellaptitat*) are made by an *enyettikano,* the present chief one being at Kaderko, where I was unable to go. A "doctor" will teach only his son.

Bleeding.—The wound is dressed with the pith of the wild pawpaw (*afuk*), which has, so it has been said, the property of healing wounds very quickly.

I was told that no amputations are performed even for snake-bite. No ceremonies of purification take place after a patient's recovery. If he show less activity of brain or body than before he was ill his spirit is said to have shrunk (see page 158).

Sucking and emetics are the treatment for wounds from poisoned arrows, also drinks and washes.

Inoculation is not practised—it is for sleeping sickness near the Benue. Leaves are bound around all sores. It seems not to matter what they are so long as they are wide and soft. Judging by the way the natives walk about with huge sores on their feet—even toes missing—I should say that they cannot feel pain to anything like the extent Europeans can.

Goitre (*agwap*) has been observed, not hare-lip (see Abnormalities, page 146).

Rheumatism attacks old people and not young, I fancy, but it is so difficult to describe that I cannot say for certain. Possibly massage is employed as a remedy, it is for fatigue at times.

Gonorrhœa is rare, syphilis has not even a name.

The urinary organs are hidden in males by leather loin coverings, in married women by strings of beads or bunches of leaves (Plate XX, Fig. 1). Circumcision is practised, though sometimes it is not done until the boy has nearly reached "farming height" (see page 161).

It is said that strictures are not known.

If the teeth ache they are touched with hot iron, and "they will then come out easily."

Neither leprosy nor any other illness is thought to be hereditary, nor to be caused by any particular kind of diet.

The people are naturally more healthy and better conditioned in December, say, than in August, for at the end of the year there is plenty of food from the new harvest, whereas in the wet season they are in a state of semi-starvation.

It is said that a soap is obtained from the silk-cotton tree (*ukum*), but this is doubtful, as Kagoro seldom wash.

I have never seen any squints, nor any great differences in the colour of the eyes. Spectacles are not known.

XIII. Music—Instruments—Dances.

I was unable to hear more than one Kagoro song—and that, I believe came from the Attakka. I could not get the words (which referred to marriage), but the refrain was:—

Fig. 33.

A Kagoro youth accompanied his song on a native auto-harp made of reeds. This instrument is common to many tribes: I have come across it even south of the Benue. I heard the following also at Fada Kagoro, but whether it was played by one or two boys I am unable to say, as I saw no trace of the player. The flutes are made from guinea-cornstalks.

Fig. 34.

At Mersa (Kajji) I saw (and heard) a dance on three occasions. The instruments were horns and drums, one of the latter being large and played like our big drum, the other was more of a tom-tom. The wind instruments were antelope horns, 2 to 3 feet long, with a hole in the side near the point, and with about 8 to 12 inches of a gourd fastened to the other end to give a wider mouth (see Plate XXII, Fig. 2, No. 21). A few of the players performed solos, and seemed to get sounds like those of a violin out of them, the intervals were so small, they seem impossible to write. The choruses were:—

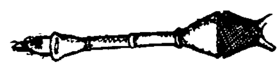
Fig. 35.

Fig. 36.

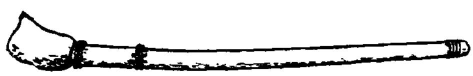
Fig. 37.

There are no words to this; the people march round and round the band, taking three steps forward and then one back. Old women dance singly, and they may carry their babies while doing so. Young women may catch hold of each other (as do the men), one behind the other, to the number of perhaps four; small unmarried girls may wear leaves for this (see page 153). The women wag their tongues quickly from side to side, and squeal. This sound is generally known by the Hausa name *kururua*. The dance is, I believe, intended to honour an important person; it was twice performed for my benefit and once for that of a chief whom I had just appointed, but it—or something like it—is also performed at funerals. The band stands in a circle, and after a time the big drummer (the leader of this band) will advance towards the centre, and is followed by the side-drummer and the horn players in turn. They go around a few times and then kneel in front of the person honoured for his reward. An old woman may dance a *pas seul* at the same time, the other dancers standing still.

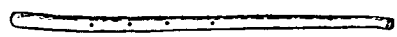
SYRINX.



WIND INSTRUMENT.

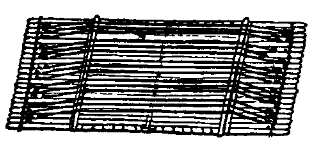


WIND INSTRUMENT.

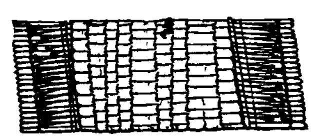


FLUTE.

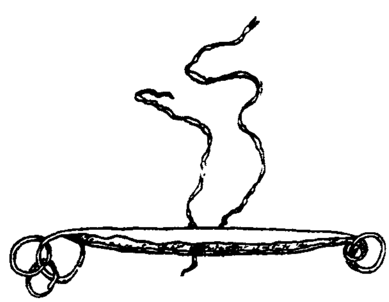
Other Kagoro instruments are a flute and a kind of clarionet, both made of wood. A syrinx was found in Jigya, but whether this was native to the town or imported I am unable to say.



AUTO-HARP, FRONT VIEW.



AUTO-HARP, BACK VIEW.



RATTLE (COPIED FROM HAUSA) ATTACHED TO GUITAR-LIKE INSTRUMENTS

XIV. War—Hunting—Relations of Animals to Man.

War.—There is a very close connection between the hunting and the war parties of the head-hunting tribes under review. A chase may easily be turned into a battle, even amongst the hunters themselves, when the arms for both are the same, and the search for beasts may become a hunt for men.[1]

From the account given me by the Kagoro (see page 139) it would appear that when they first came to the land they now occupy they were dependent on the chase for their food, and that they lived in caves. Somehow or other they discovered the bow and arrow (even now the Gannawarri use spears on horseback), and began to drive off the dangerous and kill the edible beasts.

It does not appear that all male adults *must* fight in case of war, but, judging by their general behaviour, I should not think any would refuse. The country is so small that the Kagoro are always within easy distance of their towns. They go out in the early morning, fight by day, and return to sleep at night. They tried to surprise the patrol sent to punish them in 1908 about 9 p.m., but were unsuccessful; this was the first night attack Europeans had ever experienced in the district.[2] The warriors take food enough to last them for the day, but if fighting near their own houses their womenfolk will probably bring them something extra. There seems to be no need for any permanent organisation for war during peace, for all are in training, and none ever leave their houses without their weapons. Boys learn how to scout and take cover by practising with stones.

There does not seem to be any formal declaration of war,[3] fights usually arise from sudden quarrels; but if there be any delay between the disagreement and the actual fighting the women or people of a town friendly to both sides usually hear of it and pass the word along. An alliance was formed with Katab people long ago (see page 138). Before a war is decided upon the elders and priests repair to the sacred grove (see page 160) and ask the opinion of the spirits. This is usually favourable, and then a leader is appointed, the *agwam wuta*. He is usually chosen for his skill in arms, and may not be either the chief or the head priest, as these follow behind their troops and cheer or drive them on as the case may be. Boys who have shown the right qualities in the sham fights with stones will be noted for posts as subordinate leaders when they grow up. Religion is conducive to warlike prowess, for (1) the strongest on earth will be the strongest in the next world, and (2) the spirit of a slaughtered enemy will attend the slayer. There is also, of course, the admiration of the belles of the village, and the effect of the stories and songs of the prowess of bygone heroes.

[1] As happened in the case of the Abor, according to some accounts.

[2] Mada attacked a patrol at night in February, 1910. A patrol is now (July, 1912) operating against this tribe to avenge the murder of Mr. Campbell.

[3] The Gannawarri, however, have what the Hausa call a *wasan wuka* (knife sharpening) for about three days between the quarrel and the attack.

When the forces have assembled, the chief priest addresses them, also the chief, and hands them over to the leader chosen, and off they start. If in alliance with another tribe, the general of the tribe making the war will command the whole. Scouts are sent out in front to avoid surprise (up trees if necessary) and to get news of the enemy, and the forces are disposed in accordance with the plan of campaign selected. When close to the expected battlefield the men extend. They keep a fairly good line, but do not trouble about the step. All are on foot—there are but very few horses amongst the Kagoro—dogs are not used. They shout their war-cry of "*Wifu, wifu,*" insult their enemies, and boast of their own deeds.

When an enemy has been slain, the victor, on removing the head with his knife, will sing a special song about it; but there seem to be no other special songs. The dance on return of the slayer has been described (page 151). It is said that the warriors do not have any songs during the actual fighting.[1]

A certain portion of the force is kept in reserve, if possible, to meet emergencies; it must be remembered that the Kagoro has but little idea of discipline. Flank attacks and surprises are practised, rallying points are decided upon, and the advantages of the ground—cover particularly—are noted and made use of.

Most of the towns are defended with labyrinths of cactus hedges, as mentioned before. There are caves in the hills, and here, if the town be attacked, the women will repair with their food and property. The men, if driven out of the town, may smash the beehives as they leave, so that the insects will attack the invaders. They seem never to have dug pits for their enemies, and this is surprising, for many of the surrounding tribes (Gannawarri, Ninzam, Yeskwa, etc.) do so. The Kagoro would be, I think, too much afraid of water to try inundating their enemy's country, but owing to the configuration such a course would in any case be impossible. Houses are never built on piles for purposes of defence. Stones are used in slings, and are thrown but are seldom rolled down on the enemy. They have never employed fire-arrows, nor have they any knowledge of earthworks, escalading, or breaching, as there are no walls in the vicinity; but they cut paths through the cactus hedges of other towns.

The weapons are (1) a wooden club; (2) a knife; (3) the bow and arrow; (4) the sling; (5) the spear for throwing or thrusting; (6) the shield. The clubs are of different shapes; the knives (see Plate XXII, Fig. 2 No. 24), are obtained from Hausa. The arrows have iron heads with flanges, and are poisoned;

AYA WOODEN SWORD.

the shafts are notched, but not feathered, (see Plate XXII, Fig. 2, No. 15). Other pagans in the vicinity use arrows with wooden heads which have been hardened in the fire (see Plate XXII, Fig. 2, No. 14). The bows are not strengthened in

[1] The Ninzam do; *vide The Tailed Head-Hunters of Nigeria*, p. 147.

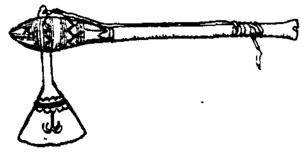
any way, but a ring is placed on the thumb when drawing the bow. I have not seen a sling, but the Sa(r)rikin Jemaa[1] assured me he had been wounded by a stone from one at Jigya. The spear has an iron head with flanges and a small piece

WOODEN CLUB IN GENERAL USE.

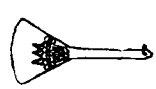
around the end of the butt, it also has a small projection on which to rest the forefinger. The shield is round and made of hide—bullock for preference (see Plate XXII, Fig. 2, No. 16)—I believe there are some of grass also, but did not see any.

KAGOMA WOODEN SWORD.

The chief causes of war are the capture of women or else the murder of men. Feuds may last a very long time between tribes, for children of a man killed even in battle will keep up the vendetta. The Kagoro have not amalgamated with any tribe. In fact, although they repeatedly defeated the Kajji, they seem never to have followed up their victories nor to have deprived them of any land, though indirectly this happened because the Kajji were too frightened to go to any farms near the frontier. I should not think that knowledge of any of the arts or culture of other tribes has come to the Kagoro through war, nor has migration been promoted by it to any great extent.



NINZAM AXE.



AXE-HEAD.

When one side is tired of the war, women of the other tribe married to men of the former tribe are sent to their relatives with offers of peace. They are naturally sacred, for they have friends on both sides. If peace is agreed upon, representatives of both tribes meet as explained on page 164, and swear friendship.

There is no general division of spoil: each keeps what he takes.

[1] This chief (who died last year, 1911) had seen a lot of fighting, and had been wounded some eight times.

I am told that there are no omens nor special preparations connected with war; there is no preservation of chastity, for instance. Fighting is probably much less tiring to them than tilling the fields. Besides the training in taking cover from stones, boys are taught to wrestle body to body, and to catch each other's feet. A kind of hockey is also played, I understand.

Hunting.—Notices are sent around when parties are to be formed. They are —as mentioned before—practically identical with war parties except for the fact that the chief seems to have more power than in an organised expedition. The spirits are first consulted (three days' beer-drinking) as before a war.

There are practically no large animals now in the Kagoro country, so the rat and field-mouse are the only "game." Most of the grass is burnt off during November and December, and these animals can then no longer conceal themselves, fire being employed, apparently, more for the purpose of clearing than for driving the quarry. Sometimes patches of grass (perhaps 12 feet high) are left, and these are trampled down, so that the inhabitants will be driven out into the open where the men advance in line, with their arrows fitted and bows stretched. I have twice seen hunting parties but no "game," so I do not know if they are good shots or not. I should think they must be though, for hunger maketh a good marksman, and unless they could hit targets when they got the chance it would hardly be worth while looking for them.

Each party keeps to the limits of the land of its own town when hunting singly, but usually men of several villages join together. There are, I understand, no strict game laws; with the exception of what is stated below, each man gets what he can, where he can, when he can. The hunts will last from early morning until sunset, and some men will be away every day from November to March. The harvest is over (October–November), the houses have been re-roofed (same time, *i.e.*, before the grass is burnt), there is no planting until April or May, and so there is nothing else to do but to "kill something."

There is only one permanent blacksmith amongst the Kagoro[1] (a Hausa-Filani from Dangoma). He told me that he made all his arrows of a similar pattern, so that everyone who buys from him has the same kind of missile. All, however, do not patronise their home industries, but go to Jemaan Daroro, or Zangon Katab or Moroa for them, so that there are several patterns. In addition to this there is no doubt that some private marks are made, at any rate everyone knows his own arrow, and this is important, because all game belongs to him who first wounds it. Even if the wound be slight and the beast be despatched by another, the carcase will belong to the owner of the arrow if it be still sticking in the body, for it is held that it must die eventually owing to the poison. It sometimes happens therefore that one man will pluck out the arrows of another so that there will be no proof of ownership, and this leads to quarrels and fights

[1] The southern towns get what they want from Jemaan Daroro. The Moroa, too, have only one, the Kajji several. Sometimes travelling smiths visit these tribes just before the wet season when there will be a demand for hoes.

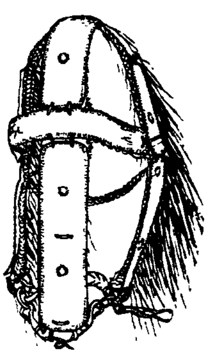
between the various partisans, especially if the disputants be of different towns. Men have been wounded in these miniature battles, and even killed. If there be no means of deciding to whom the beast[1] belongs (say if it has escaped, has got rid of the arrows, and is caught by others who did not see it wounded), the claimants will be required to go through an ordeal (see page 165) or it will be divided amongst the whole party. The owner of the carcase takes it to his house, where it is eaten by the family and relatives, he is not compelled to give any of it away, though he may ask the *meakwap* to the feast, and perhaps even the *agwam*. The people do not go hunting again until all has been eaten; none is preserved. As with us, a man may try to purchase popularity if trying for any office. The poisoned meat does not seem to be dangerous.

I have not seen any game-stalking (nor game), so do not know if they dress up to represent their quarry. The Nadu (cannibals with pierced noses to the south) do, however, and have a wooden helmet with horns to which a hide can be attached (see Plate XXII, Fig. 2, No. 18). Pits were dug for animals in the old days, but not now; and there are snares for birds, I am told. Dogs and horses are not used, but with the Gannawarri and Kibbo most of the members of the hunt are mounted, and they drive each year in a very large circle, which constantly decreases, everything in sight being slaughtered and eaten. This procedure soon exhausts the game in the country; no doubt the Kagoro did the same kind of thing formerly.

The weapons are the same as for war, the arrows all have a similarly shaped head, there is no distinction for different sized animals, they have only one point. Weapons are made to kill, or at any rate disable, so that the flesh may be secured, the skins are only a secondary consideration. It is no reproach, from a huntsman's point of view, to wound and not capture an animal, but the relatives—who would thus miss a feast—might have a word or two to say in the matter. Only men take part in hunting and fishing.

So far as I know there is no fishing with a baited hook, and I am not certain whether small cast-nets are used or not. Fish traps (Plate XIX, Fig. 32) are made of cane, the idea being the same as in our lobster-pots, but those of the Kagoro are much longer in proportion to the breadth.

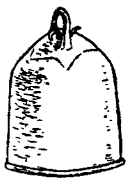
Relations of Animals to Man.—The horse is not used in war or hunting. The Kagoro and Kajji have but few, the Moroa and Attakka a fair number, brought from Zaria. They are about thirteen to fourteen hands high and rather weak. The bridle is made of leather (see Plate XXII, Fig. 2, No. 25), sometimes ornamented with brass; there is no bit, but a toothed half-hoop of iron passes behind the animal's jaw to join a similar half-hoop above the nose, and can be tightened by a



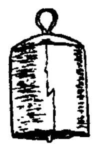
MOROA BRIDLE ORNAMENTED WITH BRASS.

[1] I have used the word "beast" above, because disputes will seldom arise about the ownership of mice, since they cannot get far away.

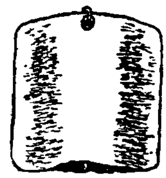
pull on a rope on the left side, which forms the rein. The saddle—if any—is a goatskin tied on to the back. Some of the pagans in the district make a cut in the skin over the back-bone about a foot long and open it out so that the flesh swells up and forms a pad; which, after a time, seems to become callous. There are no mules nor donkeys. There is no branding nor castrating. Bells of different shapes are attached to the manes and tails of horses and to the necks of other animals.



ROUND BRASS BELL.



ROUND IRON BELL.



FLAT IRON BELL.

The dog is used as food, and always forms part of the marriage gift. It is a poor specimen—I fancy only one breed, they all look the same—but since it is a cur it makes a good watch-dog and seems to be affectionate.. It also acts as a scavenger. No cattle are kept, but goats and sheep are. The flesh is the only part used for food, not the milk. Clothing is made from the skins.

There seem to be mythical animals, but when the ancestors of the Kagoro came to the country wild beasts seem to have been numerous (see page 140). I have not heard of any monsters in the water, the crocodile is present (in the Kaduna) and he is sufficient for their imagination. As mentioned before, some say that animals have souls, others not, the former seems to be the more widely accepted view. Certain names of animals are given to children, as well as those to commemorate events; *jin*, the hedgehog, and *zat*, the buffalo, are common, also *kura* (the Hausa name for the hyæna).

No animals or birds are used for game fights. A fowl can act as deputy for a human being in an ordeal.

XV. MORALS—INHERITANCE—VARIOUS.

Morals.—It must be remembered that the Kagoro to a great extent regards things as right or wrong in proportion to the ability of the sufferer to exact compensation from the offender. Only in the case of offences against the *meakwap* (the chief priest) do the laws seem to be upheld by the whole town, the *agwam* (chief) certainly does not get such support. Once the *agwam* of Fada Kagoro was kept for two days in Jemaan Daroro by me, and on his return found that two of his goats had been stolen, and Abomong lost a wife when away from Moroa for three days. It was therefore very hard to prevail upon any of these people to visit me.

There are, I think, no legends of heroic ideals of moral excellence, he who is strongest on earth is strongest also in the next world, so there is no virtue in humility.

It is wrong to steal from a fellow tribesman—especially one of the same town—although he may not be strong enough to have the thief punished, but it is no crime to steal from a stranger. Wives and children are, I should say, treated very well because they can always run away to the women's fathers. Generosity at times of *akann* feasts or hunting is praiseworthy, but I doubt if it is much practised at other times. Moroa and Kajji are more open-handed than the Kagoro, owing to their countries being more peaceful and open to traders, and perhaps—with the Kajji, at any rate—also on account of the Mohammedan influence. Gluttony, laziness (except in the young men and all females) and dirtiness are very far from being condemned, since all are guilty. The *meakwap* is respected, the *agwam* also, but to a less degree, except for this there is but little reverence shown to the aged.

Inheritance.—(*a*) *Children.*—When a woman conceives, or within a certain time after the birth (three years is the outside limit), the husband, if he wants the child, must make a present of three goats[1] to his father-in-law. If the woman has changed husbands meanwhile, endless disputes arise, for her father can let another inherit the child if he pays him five goats (and, as in courtship, he often takes presents from more than one), or the woman may refuse to give her offspring to either her father or husband. A child always belongs to the woman's father unless the husband has paid the proper fee within the proper time, and never to the woman herself.

(*b*) *Property.*—The grown-up son of the deceased will inherit the house and any of his father's wives—except his own mother—not taken by his *paternal* uncles, who share in the property together with the other brothers. If the children are all small, the paternal uncles manage the property for them; if no children, they take it. Only sons inherit land not daughters, and the widow gets nothing, for she has never properly entered her husband's family, being always subject to her father, and as he has been paid for her, nothing more can go to her family. Daughters will receive property from their husbands later, their marriage fees will be received by their eldest brother if grown up, or else by their paternal uncles, but the uncles on the mother's side get nothing. If the widow has no grown-up family, nor step-family, nor brothers-in-law, she can marry and bring her husband to the house, as she seems in this case to have a temporary interest, though it is not for life. Also if she has no brothers-in-law nor grown up stepsons (who might claim her in marriage), she can live with her son if grown up, and look after his children, if any.

(*c*) *Land.*—A man is free to mark out a farm on any unoccupied land. He must consult the spirits (see page 155), but no permission is necessary from the chief. If he has begun to till the land he establishes a claim to it so long as he keeps it under cultivation, but if he abandons the farm another can then take it. No female can inherit or own land, nor male minors until grown up, only those (men) who can farm. Stones and twisted grass are usually used to mark the

[1] There is some slight variation in the fee, no doubt depending on the rank of the persons concerned. See p. 169.

boundaries, and if a neighbour moves these he must restore the stolen land if caught, but it is, probably, not wrongdoing, only sharp practice.

Various.—When an accused has been captured and brought to trial, the procedure is as follows. The *meakwap* calls the elders together to form a court, the accused is present with his relatives; if a minor, his father or guardian acts for him. If he says he is innocent, and there are no witnesses to the crime, he is discharged; if there are witnesses he must drink *sap* (see page 165). A man bringing a false charge is likely himself to be accused of the crime, but there is no punishment otherwise. The punishments are death, compensation, fine, and banishment. A wife may pay her fine through her husband or her father; in the latter case the marriage is dissolved. Children are not punished except for theft. There is no flogging inflicted by a court.

If sons kill even their fathers' murderers they must spend a year out of the town.

Adultery is a grave offence, but it is almost unknown. If a woman leaves her first husband for another, and the second is away, the first may urge her to return. If he succeeds and has connection with her this is not adultery; if, however, the act were to take place in his rival's house it would be, for the woman is then considered as belonging to the first husband again. If the first *did* sleep with the woman in the rival's house the latter, if he caught them, could kill the man without punishment. The woman would not be killed, for she would be a loss, also no other woman would marry the slayer. Offences against chastity, although not crimes, are very seldom committed, owing to the fear of ridicule and contempt.

The modes of execution are stoning for offences against religion, choking for using black magic, but for all private quarrels the vendetta ensures the use of the knife, club, or arrow. I should say that there was even of old very little real loss of life unless the disputants fought at once, for most of the judges and injured parties being habitually thirsty individuals, a feast of *akann* would nearly always secure an acquittal.

APPENDIX I.

THE HARE AND THE GUINEA-FOWL.

(Related by Tagamma.)

The hare and his friend the guinea-fowl set out to salute his mother-in-law (another hare). As they were about to go, flour was ground and put in the haversacks. When they had arrived at a stream, they put (them) down, so that the parents-in-law should not see. When they had hidden the flour and a spoon and a ladle (in different places along the route), the hare sent the guinea-fowl on ahead and said, "If when you have arrived at the house you see that we have been given soup bring it back and get the ladle; if we have been given porridge, bring it back and get the spoon." When the guinea-fowl had gone, the hare ate up all the flour (which, mixed with water, is the usual refreshment of the traveller), and

when she had returned, bringing the soup, the hare sent her back to get the ladle. When she had gone, he drank up all the soup, and when she returned he said, "How long you have been, my father-in-law has been and has drunk up all the soup, but I have left you a little from my share."

Then the hare again sent the guinea-fowl on ahead, and said, "If we have been given porridge, bring it back and get the spoon." When she had returned, bringing the porridge, the hare sent her back to get the spoon. When she had gone, he drank up all the porridge, and when she returned, he said, "How long you have been, my father-in-law has been and has eaten up all the porridge, but I have left you a little from my share."

When she saw that there was no more food, they set out for home. When they had reached the stream where they had left their flour, the hare said, "Now let us make *fura* (flour and water), you go over there, while I drink mine here, then you come here and I will go over there, and let you drink yours." When she had gone, he ate the lot and left only the dregs, and when the guinea-fowl came to eat hers, the hare called out, "*U—u—u.*" Then the guinea-fowl said, "What is it?" He replied, "It is (the sound of) mourning, our people have died." Then the guinea-fowl asked, "What shall we do since our people are dead?" The hare replied, "Do not let us return to the city to die, I am going to die in the water, you throw yourself into the fire." And he continued, "O guinea-fowl, if you see the water become red, you will know that it is my blood, and that I am dead. Then you must throw yourself on to the fire," and she replied, "Very well." So the hare went and threw some red earth into the water, and when the guinea-fowl saw that the water had become red, she threw herself on to the fire.

When the hare smelt the feathers burning, he came up and said, "I have obtained a feast." So he plucked the guinea-fowl and ate her, and said, "Ahem, this one has not much flesh."[1]

[1] For the stories from which this has come in all probability, see *Hausa Superstitions and Customs*, No. 24, and *Folk-Lore* (Sept. 1910), No. 13.

APPENDIX II.—PHYSICAL MEASUREMENTS.

No. in series.	Nationality.	Height standing.	Height sitting.	Height kneeling.	Head length.	Head breadth.	Head circumference.	Head height.	Facial length.	Facial breadth (inter-zygo.).	Facial breadth (biorb.).	Naso-malar breadth.	Nasal length.	Nasal breadth.	Span.	Cephalic index.	Nasal index.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
16	Kagoro.	1632	788	1202	192	144	557	213	101	137	103	109	43	45	1762	75·00	104·65
19	,,	1745	844	1270	194	142	544	208	116	136	97	108	51	46	1940	73·19	90·19
38	,,	1652	779	1240	187	139	541	211	108	141	106	113	42	48	1773	74·27	114·28
52	,,	1601	788	1185	183	139	528	204	112	123	99	112	50	47	1730	75·95	94·00
134	,,	1645	791	1204	182	139	528	213	118	134	103	114	55	47	1762	76·37	85·45
161	,,	1559	790	1182	183	141	528	209	117	136	106	121	51	42	1685	77·04	82·35
162	,,	1656	840	1223	188	143	538	224	117	142	105	116	48	44	1858	76·06	91·66
163	,,	1600	831	1210	185	135	523	214	105	134	102	114	42	44	1734	72·97	104·76
164	,,	1631	840	1213	179	137	521	210	107	132	104	113	45	45	1766	76·53	100·00
165	,,	1612	870	1195	191	147	560	224	107	139	106	113	52	47	1803	76·96	90·38
		16333	8161	12124	1864	1406	5368	2130	1108	1354	1031	1133	479	455	17813	754·34	957·72
166	,,	1533	823	1131	191	146	545	214	111	135	91·1	114	45	37	1687	76·43	82·22
167	,,	1561	860	1142	181	144	525	218	107	135	108	118	47	43	1764	79·55	91·48
168	,,	1555	855	1151	193	145	553	221	114	139	110	120	51	47	1756	75·12	92·15
169	,,	1539	856	1132	183	137	526	206	106	133	103	116	46	42	1806	74·86	91·30
170	,,	1655	874	1198	182	145	539	224	109	139	101	109	44	41	1885	79·66	93·18
171	,,	1600	841	1174	195	144	557	225	116	137	103	113	52	47	1767	73·84	90·38
172	,,	1534	805	1128	187	142	536	221	108	142	100	109	43	45	1810	75·93	104·65
173	,,	1577	840	1155	186	142	535	218	107	139	101	110	45	42	1803	76·34	93·33
174	,,	1625	848	1190	197	148	553	222	122	142	101	112	54	45	1860	75·12	83·33
175	,,	1516	840	1118	192	141	550	218	109	132	103	115	47	43	1724	73·43	91·48
		15695	8442	11519	1887	1434	5419	2187	1109	1373	1021·1	1136	474	432	17862	760·28	913·50

176	„	1610	813	1189	181	140	525	217	116	142	109	128	48	43	1829	—	—
177	„	1545	821	1140	193	139	543	217	109	139	101	112	52	44	1760	—	—
178	„	1602	835	1160	193	146	559	214	112	146	108	122	46	43	1926	—	—
179	„	1423	776	1151	183	141	520	204	116	130	—[1]	—[1]	58	46	1672	—	—
180	„	1575	789	1153	178	149	532	198	81	142	94	105	40	44	1755	—	—
181	„	1561	824	1145	185	143	534	226	114	137	107	120	46	41	1718	—	—
182	„	1610	866	1202	197	145	564	223	141	139	111	121	48	42	1808	—	—
183	„	1602	854	1168	199	146	561	230	119	140	108	116	47	47	1876	—	—
184	„	1646	863	1199	189	135	542	217	113	138	105	115	53	45	1868	—	—
185	„	1690	849	1234	195	143	561	224	115	140	109	115	49	42	1906	—	—
		15864	8290	11741	1893	1426	5441	2170	1136	1393	*952*	*1054*	487	437	18118	—	—
186	„	1601	878	1170	195	145	558	226	114	140	111	120	46	46	1770	—	—
187	„	1652	846	1210	184	144	532	218	107	136	101	112	48	46	1933	—	—
188	„	1564	841	1151	186	140	531	222	112	137	110	118	44	46	1742	—	—
189	„	1732	900	1290	191	144	540	224	109	136	105	113	46	56	1965	—	—
190	„	1545	868	1116	186	132	527	230	116	137	106	120	52	51	1955	—	—
301	„	—	—	—	189	145	541	213	105	133	—	—	46	43	1765	—	—
302	„	—	—	—	190	146	534	222	118	141	—	—	50	47	1880	—	—
303	„	—	—	—	187	147	561	217	110	143	—	—	45	44	1770	—	—
304	„	—	—	—	175	144	525	217	111	136	—	—	38	39	1788	—	—
305	„	—	—	—	182	142	531	210	110	134	—	—	54	41	1788	—	—
		8094	*4333*	*5937*	1865	1435	5380	2199	1112	1373	*533*	*583*	469	449	18356	—	—

[1] Eyes diseased.

PHYSICAL MEASUREMENTS—*contd.*

No. in series.	Nationality.	Height standing.	Height sitting.	Height kneeling.	Head length.	Head breadth.	Head circumference.	Head height.	Facial length.	Facial breadth (inter-zygo.).	Facial breadth (biorb.).	Naso-malar breadth.	Nasal length.	Nasal breadth.	Span.	Cephalic index.	Nasal index.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
306	Kagoro	—	—	—	199	148	574	228	119	140	—	—	50	44	1788	—	—
307	"	—	—	—	187	139	535	215	117	134	—	—	47	47	1855	—	—
308	"	—	—	—	190	145	547	210	104	129	—	—	47	44	7685	—	—
309	"	—	—	—	192	143	550	218	118	133	—	—	47	41	1760	—	—
310	"	—	—	—	186	143	542	221	111	141	—	—	46	46	1785	—	—
311	"	—	—	—	192	148	547	227	119	135	—	—	48	43	1680	—	—
312	"	—	—	—	192	132	533	206	108	140	—	—	51	41	1789	—	—
313	"	—	—	—	197	141	566	230	115	141	—	—	56	45	1770	—	—
314	"	—	—	—	196	147	568	230	122	141	—	—	46	46	1765	—	—
315	"	—	—	—	193	141	550	218	118	141	—	—	49	45	1772	—	—
		—	—	—	1924	1427	5512	2203	1149	1375	—	—	487	442	17649	—	—
316	"	—	—	—	189	142	531	207	105	133	—	—	47	42	1721	—	—
317	"	—	—	—	191	142	540	216	116	141	—	—	49	44	1794	—	—
318	"	—	—	—	186	141	552	214	108	136	—	—	47	44	1639	—	—
319	"	—	—	—	190	146	547	224	107	132	—	—	39	44	1600	—	—
320	"	—	—	—	192	142	540	223	118	136	—	—	57	41	1665	—	—
321	"	—	—	—	188	146	544	224	113	137	—	—	47	44	1803	—	—
322	"	—	—	—	181	145	532	228	117	136	—	—	47	43	1746	—	—
323	"	—	—	—	191	151	550	217	100	138	—	—	46	46	1706	—	—
324	"	—	—	—	191	141	550	226	116	138	—	—	44	45	1658	—	—
325	"	—	—	—	187	147	540	217	105	136	—	—	44	41	1766	—	—
		—	—	—	1886	1443	5426	2196	1105	1323	—	—	467	434	17098	—	—

326	,,	—	—	—	182	132	518	219	110	128	—	—	46	47	1753	—	—
327	,,	—	—	—	192	144	550	233	125	141	—	—	50	46	1850	—	—
328	,,	—	—	—	197	136	552	225	105	142	—	—	49	46	1835	—	—
329	,,	—	—	—	176	143	518	209	99	130	—	—	47	45	1695	—	—
330	,,	—	—	—	193	140	548	231	112	134	—	—	45	45	1790	—	—
331	,,	—	—	—	188	139	527	227	119	138	—	—	48	42	1859	—	—
332	,,	—	—	—	181	144	532	224	111	141	—	—	49	51	1685	—	—
333	,,	—	—	—	195	149	561	225	116	137	—	—	57	44	1827	—	—
334	,,	—	—	—	175	139	515	217	106	133	—	—	46	43	1687	—	—
335	,,	—	—	—	172	135	508	206	106	131	—	—	51	43	1782	—	—
		—	—	—	1851	1401	5323	2216	1129	1355	—	—	488	452	17763	—	—
17	,,	1707	855	1272	187	145	542	223	121	137	94	107	53	44	1882	7752	8301
[1]18	,,	1576	825	1160	193	143	556	218	118	138	102	117	47	42	1595	7409	8936
		3283	*1680*	*2432*	*380*	*288*	*1098*	*441*	*239*	*275*	*196*	*224*	*100*	*86*	*3477*	*15161*	*1723*

[1] Omitted by clerk from proper place in list and in calculations

PHYSICAL MEASUREMENTS—*contd*

No. in series.	Nationality.	Height standing.	Height sitting.	Height kneeling.	Head length.	Head breadth.	Head circumference.	Head height.	Facial length.	Facial breadth (inter-zygo.).	Facial breadth (biorb.).	Naso-malar breadth.	Nasal length.	Nasal breadth.	Span.	Cephalic index.	Nasal index.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
117	Kajji	1653	850	1232	199	141	565	225	114	141	108	119	47	47	1860	70·85	100·00
118	„	1643	866	1229	202	148	578	234	116	143	106	115	52	43	1830	73·26	82·69
120	„	1716	850	1255	207	154	590	219	120	146	112	121	56	48	1944	72·45	85·35
121	„	1768	905	1320	201	150	578	226	109	145	113	120	49	48	1945	70·14	97·95
123	„	1685	834	1245	184	140	533	226	119	136	102	112	45	45	1837	76·08	100·00
124	„	1696	844	1245	186	144	540	222	119	137	106	113	45	43	1952	77·41	95·55
126	„	1720	900	1275	190	140	548	226	123	135	106	117	52	43	1908	73·68	82·69
127	„	1697	824	1261	191	141	544	220	92	131	100	110	46	43	1810	73·80	93·46
128	„	1641	800	1220	182	144	541	203	113	143	103	118	50	44	1845	79·12	80·00
129	„	1702	854	1280	202	139	565	233	128	141	106	115	56	43	1826	68·81	76·78
		16921	8527	12562	1944	1441	5582	2234	1153	1398	1062	1160	498	447	18757	735·60	894·47
130	„	1690	825	1238	184	144	535	203	116	140	107	117	56	44	1880	78·26	78·53
131	„	1700	851	1265	196	149	565	230	112	134	110	116	46	47	1858	76·01	102·17
132	„	1789	867	1275	190	143	543	223	113	139	101	112	55	51	1902	75·26	92·72
133	„	1713	859	1286	190	145	558	229	114	142	103	111	46	46	1885	76·31	100·00
135	„	1872	905	1379	203	145	575	244	129	142	105	116	57	46	2400	71·42	80·70
136	„	1672	795	232	184	142	534	214	141	134	101	112	47	43	1816	77·17	91·48
137	„	1748	926	1310	200	148	573	234	116	146	108	123	45	51	1680	74·00	113·33
138	„	1628	821	1195	196	145	556	216	116	136	112	126	49	43	1897	73·97	87·75
139	„	1661	851	1238	190	144	540	222	112	140	111	120	45	44	1799	75·79	97·55
143	„	1648	781	1212	191	144	560	210	106	144	113	123	49	43	1818	75·39	87·75
		17121	8481	12630	1924	1449	5539	2225	1175	1397	1071	1176	495	458	19135	753·58	931·98

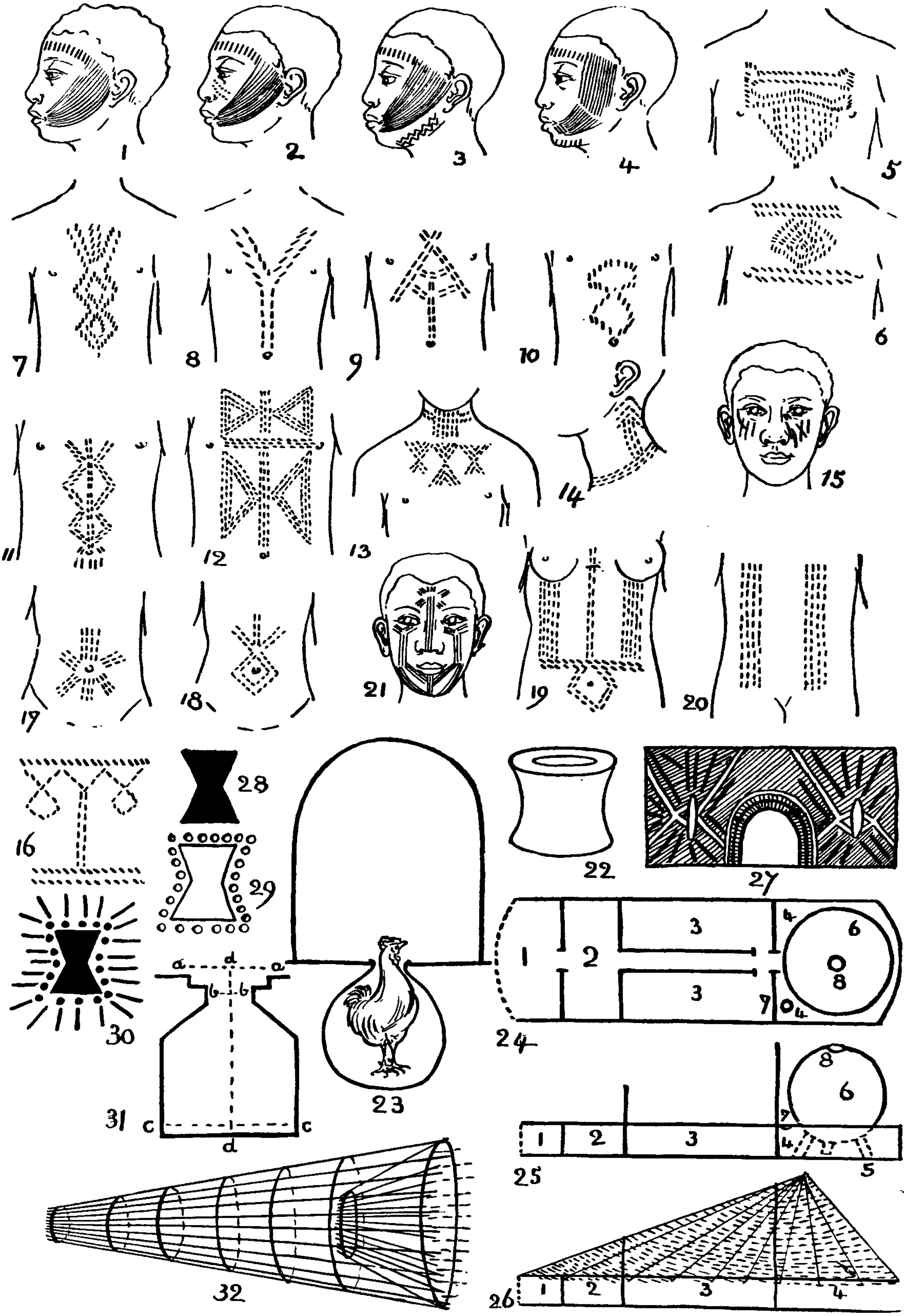
144	„	1675	804	1213	191	140	541	209	116	135	105	118	54	46	1920	73·29	85·18
145	„	1373	778	1172	189	150	548	216	115	139	106	116	49	46	1702	79·36	93·87
146	„	1666	846	1245	197	148	568	236	115	143	111	119	47	40	1795	75·12	85·11
147	„	1603	793	1192	187	144	545	207	109	131	104	116	47	47	1740	76·47	100·00
148	„	1686	845	1250	196	142	558	231	113	141	109	118	49	47	1875	72·45	95·91
149	„	1655	827	1251	190	138	532	221	111	131	101	111	46	42	1775	73·15	91·30
150	„	1643	812	1270	187	147	544	216	116	134	105	118	46	38	1778	78·60	82·52
151	„	1870	918	1380	204	146	577	236	120	148	110	128	49	49	1983	71·56	100·00
153	„	1613	845	1210	188	141	537	209	102	129	101	110	45	48	1750	73·93	106·66
154	„	1656	866	1236	191	146	550	226	119	145	108	121	51	45	1843	76·43	88·23
		16445	8335	12419	1920	1442	5500	2207	1136	1376	1060	1175	483	448	18161	750·36	928·78

336	„	—	—	—	197	149	—	237	125	140	—	—	53	46	—	—	—
337	„	—	—	—	191	142	—	221	116	140	—	—	52	47	—	—	—
338	„	—	—	—	200	143	—	229	123	144	—	—	51	51	—	—	—
339	„	—	—	—	200	140	—	220	121	141	—	—	50	51	—	—	—
340	„	—	—	—	181	134	—	221	120	140	—	—	50	45	—	—	—
341	„	—	—	—	197	147	—	226	116	147	—	—	52	42	—	—	—
342	„	—	—	—	186	150	—	220	116	146	—	—	55	42	—	—	—
343	„	—	—	—	196	151	—	219	114	143	—	—	48	46	—	—	—
344	„	—	—	—	193	137	—	214	106	142	—	—	45	46	—	—	—
345	„	—	—	—	193	151	—	219	118	*128	—	—	51	45	—	—	—
		—	—	—	1934	1444	—	2226	1175	1411	—	—	507	461	—	—	—

* Top of skull projected to even outside the ears.

PHYSICAL MEASUREMENTS—*contd.*

No. in series.	Nationality.	Height standing.	Height sitting.	Height kneeling.	Head length.	Head breadth.	Head circumference.	Head height.	Facial length.	Facial breadth (inter-zygo.).	Facial breadth (biorb.).	Naso-malar breadth.	Nasal length.	Nasal breadth.	Span.	Cephalic index.	Nasal index.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
346	Kajji	—	—	—	191	146	—	241	123	146	—	—	50	47	—	—	—
347	"	—	—	—	189	149	—	222	105	133	—	—	47	45	—	—	—
348	"	—	—	—	200	151	—	225	110	137	—	—	47	48	—	—	—
349	"	—	—	—	196	144	—	238	122	146	—	—	49	45	—	—	—
350	"	—	—	—	184	143	—	206	105	142	—	—	45	47	—	—	—
351	"	—	—	—	199	146	—	248	128	144	—	—	58	51	—	—	—
352	"	—	—	—	198	141	—	218	113	136	—	—	45	47	—	—	—
353	"	—	—	—	187	143	—	220	114	134	—	—	48	44	—	—	—
354	"	—	—	—	186	140	—	217	116	144	—	—	57	47	—	—	—
355	"	—	—	—	188	134	—	211	109	136	—	—	51	45	—	—	—
		—	—	—	1938	1437	—	2246	1145	1418	—	—	497	466	—	—	—
356	"	—	—	—	180	141	—	213	109	134	—	—	46	44	—	—	—
357	"	—	—	—	196	158	—	232	122	136	—	—	45	46	—	—	—
358	"	—	—	—	178	151	—	218	112	144	—	—	45	44	—	—	—
359	"	—	—	—	198	145	—	208	109	145	—	—	49	49	—	—	—
360	"	—	—	—	185	143	—	203	106	133	—	—	42	40	—	—	—
		—	—	—	*917*	*738*	—	*1074*	*558*	*692*	—	—	*227*	*223*	—	—	—



NOTES ON SOME NIGERIAN HEAD-HUNTERS.

FIG. 1.—A KAJJI GIRL OF MERSA.

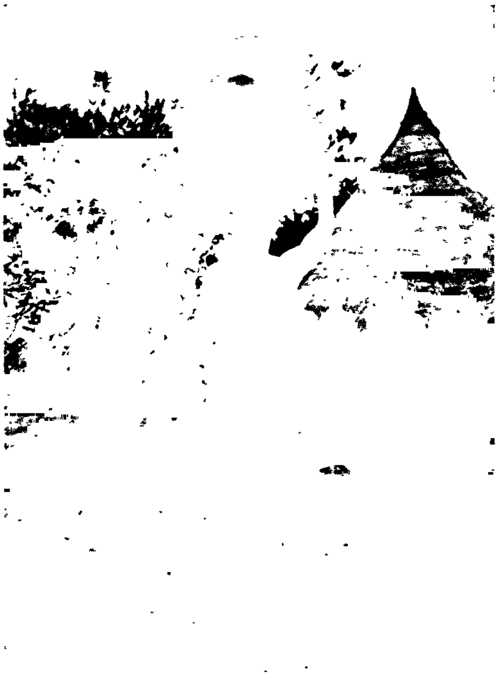


FIG. 2.—A MOROA WOMAN OF AKUT.

FIG. 3.—THREE KAGORO WOMEN OF TUKU TOZO, AND (ON THE RIGHT) AN ATTAKKA WOMAN.

NOTES ON SOME NIGERIAN HEAD-HUNTERS.

(*Photo. Lieut. Ewatt.*)
FIG. 1.—MAN OF GITA BISSA, SAID TO BE A MADA, POSSIBLY A NADU.

(*Photo. Lieut. Ewatt.*)
FIG. 2.—MADA MAN OF GITA BISSA.

(*Photo. Lieut. Ewatt.*)
FIG. 3.—WOMEN OF SANGA (NINZAM).

(*Photo. Lieut. Ewatt.*)
FIG. 4.—MAMA MEN OF AKWARRA.

NOTES ON SOME NIGERIAN HEAD-HUNTERS.

FIG. 1.—KAJJI CHIEFS.

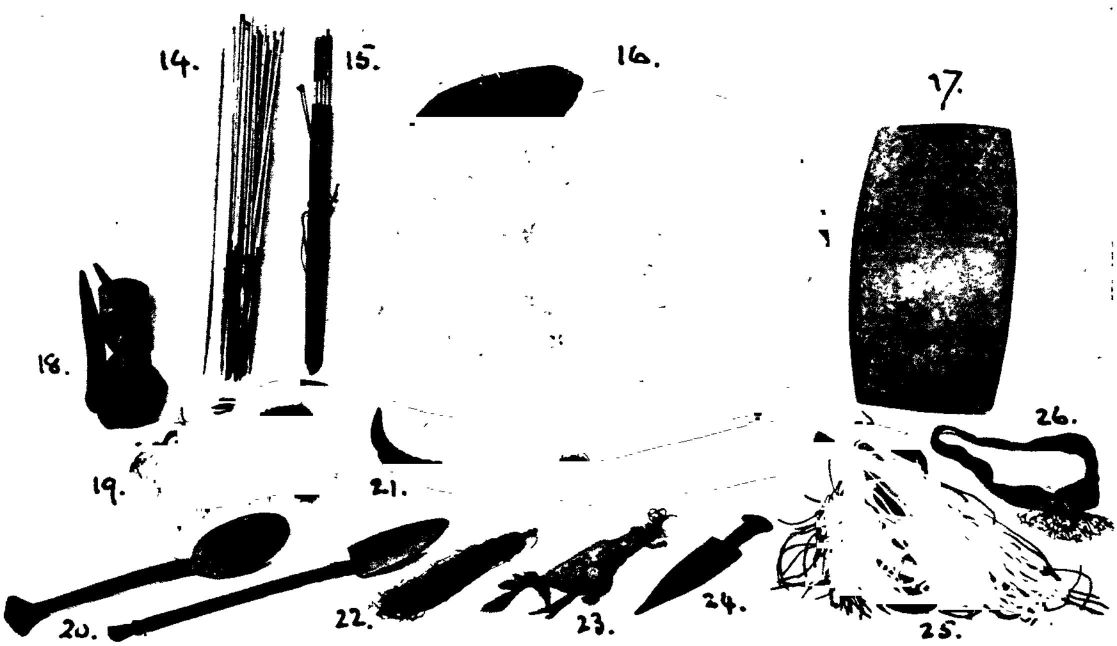


FIG. 2.

14. Wooden-headed arrows. 15. Quiver of iron-headed arrows. 16. Hide shield. 17. Wooden tray used for carrying firewood, etc. 18. Nadu hunter's wooden helmet. 19. Waiwai priest's head-dress. 20. Wooden spoons (Kagoro and general) for stirring porridge, etc. 21. Horn. 22. Kadara tail. 23. Mada magic squeaker. 24. Knife. 25. Kagoro bridle. 26. Woman's belt.

NOTES ON SOME NIGERIAN HEAD-HUNTERS.

PHYSICAL MEASUREMENTS—*contd.*

No. in series.	Nationality.	Height standing.	Height sitting.	Height kneeling.	Head length.	Head breadth.	Head circumference.	Head height.	Facial length.	Facial breadth (inter-zygo.).	Facial breadth (biorb.).	Naso-malar breadth.	Nasal length.	Nasal breadth.	Span.	Cephalic index.	Nasal index.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
142	Moroa	1730	862	1285	194	142	553	223	121	142	107	120	52	44	1883	73·19	84·61
20	Kagoro—Kajji	—	—	—	186	137	543	214	113	141	101	110	48	46	—	73·65	95·83
119	"	1594	810	1162	185	134	525	223	108	131	100	105	46	39	1732	77·83	84·78
37	Kagoro—Attakka	1721	845	1255	199	136	560	212	110	138	105	112	52	48	1840	68·30	92·30
116	Moroa—Katab	1760	865	1305	196	149	568	228	112	140	107	120	50	47	2600	76·02	94·00
140	" "	1840	908	1374	201	151	580	247	135	147	117	130	·55	44	1998	75·12	80·00
141	" "	1772	840	1300	198	131	551	216	104	134	105	120	46	49	1945	66·16	106·50
152	" "	1705	862	1270	196	148	575	225	118	140	108	124	50	45	1885	75·51	90·00

ORIENTAL STEELYARDS AND BISMARS.

By H. Ling Roth.

Mr. Ivan Chien, of the Chinese Legation in London, informs me that, according to Chinese history, scales were first made in the reign of the Emperor Fu Hi, in the year 2956 B.C., but at the same time it is not thought that steelyards are here referred to. Chinese steelyards are mentioned by Europeans almost from their first contact with China. Friar Gasparda Cruz (died A.D. 1570) mentions that "Everyone that goeth to buy in the market, carrieth a weight & balance, & broken silver, and the balance is a little beame of Ivorie with a weight hanging at the one end with a string & on the other end a little scale, and the string of the weight runneth along by the beame, which hath his markes from one Conderin to ten, or of one Maes unto ten" (Hakluyt, Glasgow ed., vol. xi, p. 507).

In the Sloane Collection in the British Museum (purchased by Act of Parliament in 1753) there is a steelyard 315 mm. long, which Sloane purchased from a Dr. Cowell, with the following description, the date of which, judged by the handwriting, is about 1650 to 1680:—

> "To weigh with ye Japan Stilliards.
>
> "When ye scale is to ye left hand; yn weighing with ye string next ye right hand 36 of ye uppermost pinns weigh 1 Tola, 72 weigh 2 Tolas, so yt each pin weighs 1/3 of a Mase, a Tola being 12 Mase.
>
> "Then weighing with ye middle string, the 4 of ye pins before you weigh 1 Tola, 16 weigh 2 Tolas, and so for every 12 pins 1 Tola.
>
> "Then weighing wth ye string next yo r left hand, the first pin before you weighs 14 Tolas, 3½ weigh 15 Tolas 7 weigh 16 Tolas, and so for every 3½ one Tola more."

It is probably one of the earliest instructions as to how the weighings are carried out, and if not quite correct is quite clear, and shows what the unit is. Quite recently a French traveller has given us the following description, which is as follows:—

> "In Burmese Laotia as in China they make use of a little steelyard (Romaine) with three fulcrums and hence with three different scales, of which the first descends to *fens* and stops at 5 *hongs*; the second goes from 5 *hongs* to 20 *hongs* giving the *thes*; the third goes from 20 *hongs* to 64 *hongs* and gives the *hongs*. These little balances can therefore weigh more than 2 kilogrammes of silver." (Fr. Garnier, *Voy. d'Expl.*, Paris, 1873, ii, p. 344.)

As a matter of fact there are very few travellers or residents in China who do not refer to the steelyard. J. F. Davis (*The Chinese*, chap. xxii), Gutzlaf (i, p. 23), Carne (*Indo-China*, London, 1872, p. 246), Otto E. Ehlers (i, p. 246, *Indo-China*), and a host of others speak of it. But, curiously enough, it is not mentioned in Ball's Guide (*Things Chinese*, 4th ed., London, 1904).

Diego de Pantala (1602), in writing of the Chinese, refers to the weighing of silver and says: "They cut it & weigh it in certayne fine Weights like the Romane Weights in our Country; & therefore everybody that will buy or sell, carryeth one of those Weights with them." (Purchas, Glasgow ed., xii, p. 374.)

The Chinese and Japanese steelyard in its simplest form consists of a beam, to which at one end a pan is attached, provided with a bob for suspension and a line of dots which indicate the weight measured.

The beams of nearly all the smaller steelyards are of bone, ivory, cane, or bambu; they are thicker at the fulcrum end, tapering down to the other end, and are marked with one or more lines of dots for indicating the weight, but not numbered, although there is in the British Museum (Fig. 8, Plate XXIV—this and other British Museum specimens are reproduced by the kind permission of Sir Hercules Read) an old one with an old label, marked "probably Italian," which is numbered from 5 to 110. They are provided with a metal pan supported by four strings, seldom three, four strings being apparently easier to set up than three, and also of greater efficiency in so far as strength is concerned; they are also provided with a weight hanging by string or hair or silk from the beam, generally spoken of as the travelling poise, from the fact that it is moved to right or left in ascertaining the weight of the article. The steelyards when in use are held by the thread and bob at the fulcrum of the respective line of dots (the scale) it belongs to.

Chinese steelyards are mostly furnished with two or three lines of dots, and every such scale has its corresponding fulcrum. The steelyards are rarely supplied with one scale and fulcrum only; in fact, Mr. I. Chien, above mentioned, writing under date of December, 1900, tells me that "It is said that some steelyards are made with one fulcrum only, but I have not seen them yet, although I have travelled a good deal in my country." Since Mr. I. Chien wrote I have obtained a couple of Japanese steelyards with one scale and fulcrum each (Fig. 3, Plate XXIII). There is no difficulty in supplying three scales to one steelyard; there is space for a fourth, and a fourth might be added, but it does not seem desirable, for by means of the third line of dots or scale the limit of its weighing capacity is probably reached. A fourth scale would be difficult to read, for, generally speaking, the scales are placed as nearly on top as possible, so as to make the reading easily accessible and to save unnecessary handling. For instance, the scales on the steelyard Fig. 6, Plate XXIV, are fixed at the following distances from each other: scales 1 and 2, 4·5 mm. apart; scales 2 and 3, 4·5 mm.; and scales 3 and 1, 16 mm. apart, the larger bare space being the underside of the beam. It is not advisable to tempt the strength of the beam or strings by putting on the full weight which the steelyard will measure theoretically. The object of the series of two or three

lines of dots or scales and corresponding fulcrums is to enable the user to weigh up to the full capacity of the steelyard. In the scales illustrated in Fig. 8, Plate XXIV, the cyphers indicate that the lowest scale weighs up to 10 units, the top scale from 10 to 50 units, and the middle scale from 50 to 110 units, and it is usual for the scales to overlap slightly. For instance, a steelyard will weigh from 0 grammes up to 185 grammes (= 5 tahils) on the first scale; from 185 to 735 grammes

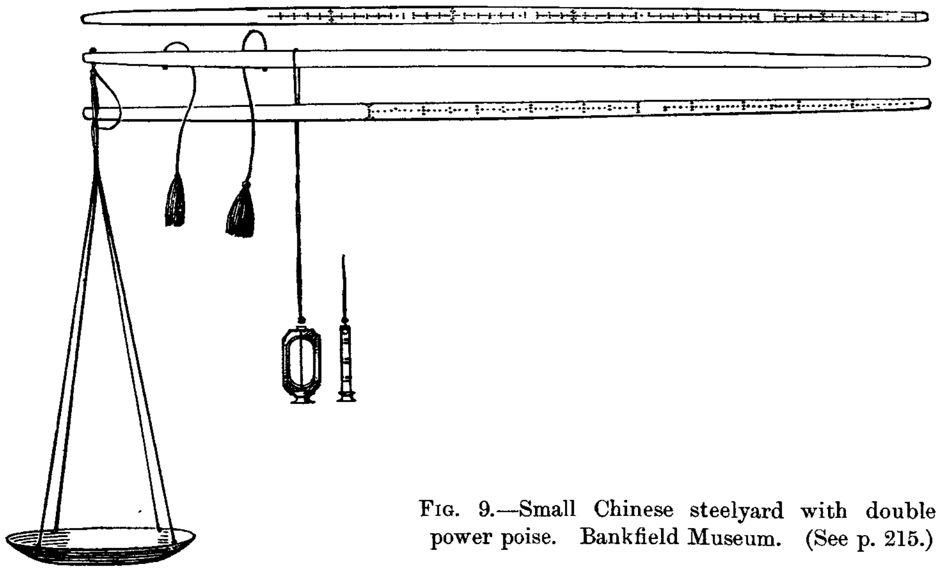


Fig. 9.—Small Chinese steelyard with double power poise. Bankfield Museum. (See p. 215.)

(=20 tahils) on the second scale; and from 735 to 1208 grammes (=2 katis) on the third scale. Consequently with the three scales the weight of an article weighing up to 1208 grammes can be taken, while if the steelyard were provided with the first scale only, then 185 grammes only could be measured off. The second and third scales could, of course, be the only scales if the smaller weights were not required. But if one intends to use a steelyard it may as well be arranged to weigh to its fullest

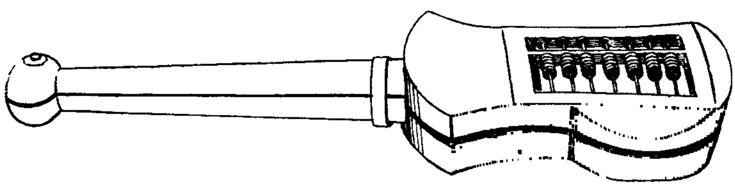


Fig. 10.—Chinese steelyard with abacus in the lid. Length 245 mm. British Museum.

capacity, especially as to do this merely necessitates an additional scale with its corresponding fulcrum. Beyond this, in order to extend the capacity for measuring a minute quantity and still to keep up the capacity to weigh as large a quantity as the steelyard will carry, a compound weight has been introduced. This will be described later on. Naturally, the greater the weight to be measured the stronger must be all the parts of the steelyard, and hence, like our balances, the steelyards are made of various sizes and strengths.

The whole fits into a case of solid wood or bambu, which is carried stuck in the waistband, although occasionally allowed to hang therefrom. (See Figs. 10 and 12 to 17.) The case is usually fan-shaped, or perhaps, more correctly speaking, in its outward appearance it resembles the Maori *mere*, and consists of two parts riveted together at one end. The upper part, the lid, is flat on the inside, and the lower part or bed, which holds the steelyard, is dug out for that purpose. Some cases are fiddle-shaped, and I have two Japanese cases which are of trapezoidal form (Fig. 17). In an example in the British Museum an abacus is fitted into the lid (Fig. 10) and sometimes the case is arranged to hold a large and a small steelyard side by side (Fig. 14). The British Museum has also a specimen in which a middle bed is placed between the lid and lower bed to hold a second steelyard which thus rests above the one in the bottom

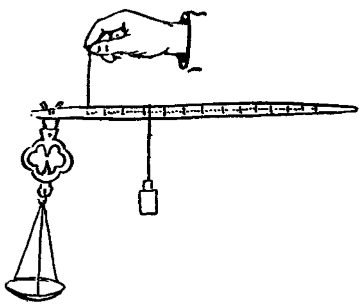


FIG. 11.—Jeweller's steelyard in J. Moura's *Cambogia*, Paris, 1883, vol. i, 369.

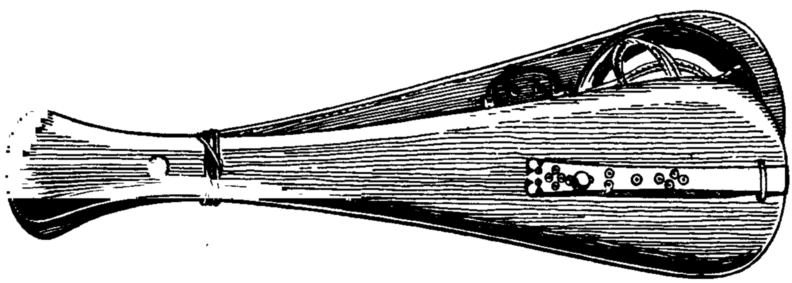


FIG. 12.—Case of compound steelyard illustrated in Fig. 1, Pl. XXIII, and Fig. 6, Pl. XXIV (for details see Figs. 18 and 19). Upper Burma.

(Fig. 13). The lid is not raised to open, but is pushed aside, being provided with a pivot for that purpose (Fig. 18), and when shut it is locked by a sliding bolt on the lid, the bent point of which fits into a slot in the lower part (Fig. 19).

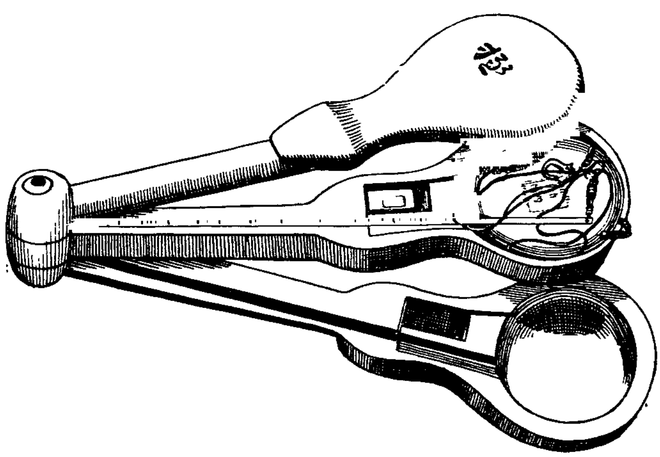


FIG. 13.—Fiddle-shaped case with two separate beds with a steelyard in each. Chinese. Length of case 290 mm British Museum.

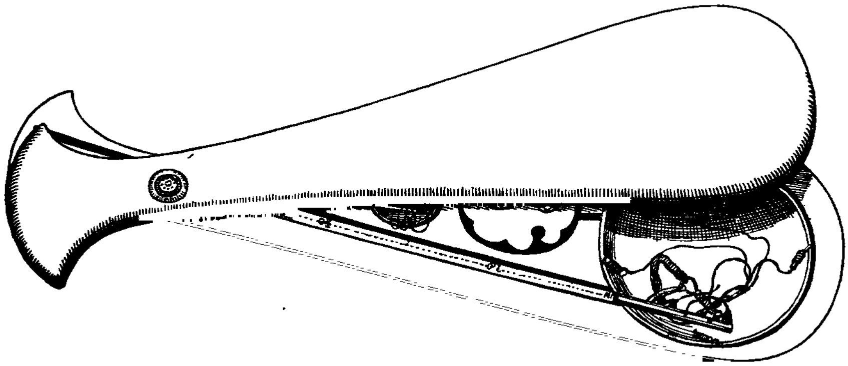


FIG. 14.—Case containing two steelyards in one bed. Length of case 430 mm. Chinese. British Museum.

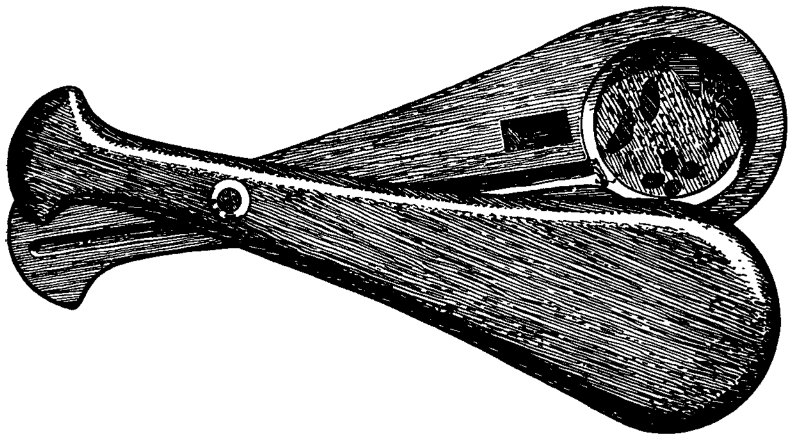


FIG. 15.—Case of steelyard, Fig. 7, Pl. XXIV. Chinese. Bankfield Museum.

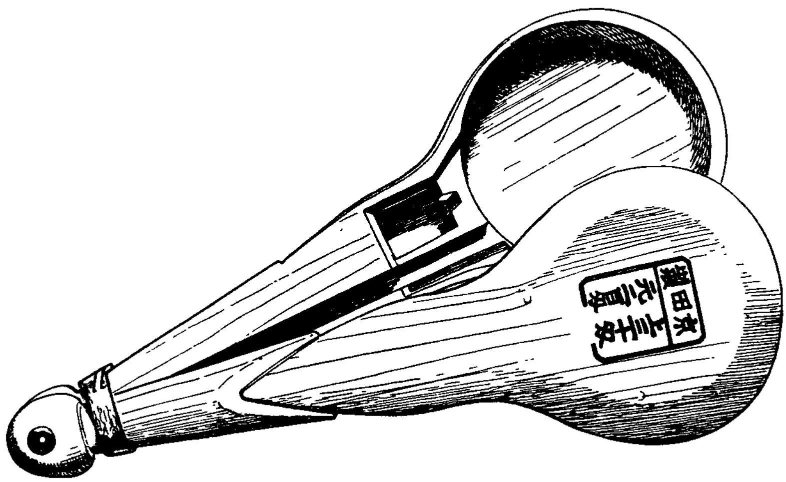


FIG. 16.—Case of steelyard, Fig. 2, Pl. XXIII. Chinese. Bankfield Museum.

All the pans I have seen are circular. The weights, while mostly flat, vary very much in shape as well as in size.

The dots for the scale are made by drilling minute holes in the beam, inserting fine red copper wire and filing it off. But this insertion of fine copper wire is only done to the larger steelyards and not to the small ivory or bone ones, which are carried about one's person, in which, while the dots may be drilled to a very shallow degree, some black matter has been rubbed in. The Reverend Arthur H. Smith, the well-known missionary, and author of *Chinese Characteristics,* informs me that "the dots are called *stars,* and the scale maker is termed a *star fixer.* The

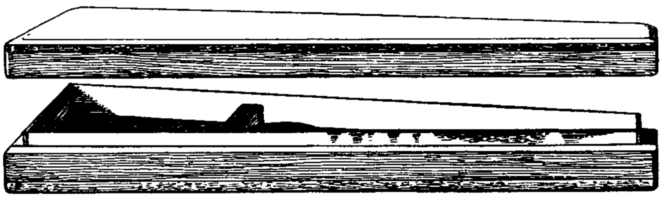


FIG. 17.—Case of Japanese steelyard with tortoiseshell pan. Bankfield Museum.

steelyard maker perambulates the street and puts in little dots according to the preferences of each customer, who will have not less than two sets of balances (*i.e.*, separate steelyards), one for buying and one for selling. There are often many grades, and it is easy to confuse costumers not up to small 'deceits and sinful games.'" I myself cannot draw any evidence from these steelyards which would confirm the statement that one scale is for buying and one for selling. There is, no doubt, great confusion owing to this irresponsible method of fitting the scale (line of dots). for Captain W. Gill, after getting his silver weighed at Tien-Tsin, and that with a great deal of trouble, tells us : "In travelling about from one city to another

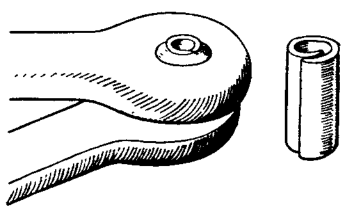


FIG. 18.—Details of case Fig. 12.

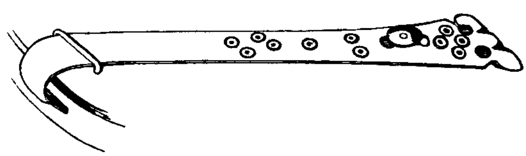


FIG. 19.—Details of case Fig. 12.

there is a further difficulty to be overcome, for every place has its own scale, and what is an ounce in one town will perhaps be less than an ounce in the next, so that the weary traveller, after having, as he thought, finally concluded the tiresome transaction, is quietly told that his scale is not a good one and the silver must all be weighed afresh in a balance of the place." (*River of Golden Sand,* London, 1880, i, pp. 45 and 46.)

With this little introduction we may now proceed to examine the steelyards individually.

In Fig. 2, Plate XXIII, is illustrated a very beautifully finished steelyard of Chinese make with Government test marks. The length of the bone beam is 226 mm.; diameter of pan, 80 mm.; poise (P) = 38·677 grammes.

Fulcrum furthest from Pan. (Scale No. 1.)				Fulcrum nearest to Pan. (Scale No. 2.)			
P. at	0 dots	=	Equilibrium.	P. at	0 dots	=	112·0 grammes.
„	50 „	=	18·5 grammes.	„	20 „	=	185·0 „
„	100 „	=	37·2 „	„	70 „	=	373·0 „
„	150 „	=	55·5 „	„	120 „	=	560·0 „
„	200 „	=	74·5 „	„	170 „	=	748·0 „
„	250 „	=	93·2 „				
„	300 „	=	112·0 „				

The unit for the first scale is thus 0·373 (112 ÷ 300) which means that for every dot the increase or decrease is about one-third of a gramme = 1 hun. For the second scale the unit is 37·4 (748 – 112 = 636 ÷ 170) = 1 tahil or one hundred times as much as that of the first scale. The second scale commences where the first leaves off. The first weighs up to 3 tahils (4 oz. avoirdupois) and the second up to 17 tahils or 1 kati and 1 tahil (1 lb. 6$\frac{2}{3}$ oz.).

It is in every way a very good steelyard, and probably as perfect as it is possible to make this class of instrument. The throwover arrangement for changing from one line to the other is ingenious—the fulcrum is changed, but the pan is not to be unhooked.

The case is shown in Fig. 16, p. 204.

Fig. 7, Plate XXIV, illustrates a steelyard from Shanghai; it is quite modern, nicely finished, with ivory beam and weight suspended by horse hair.

Length of beam, 280 mm.; diameter of pan, 61 mm.; poise (P) = 23·371 grammes.

Fulcrum at A. (Scale No. 1.)				Fulcrum at B. (Scale No. 2.)			
P. at	0 dots	=	Equilibrium.	P. at	0 dots	=	72·5 grammes.
„	10 „	=	3·5 grammes.	„	10 „	=	109·5 „
„	100 „	=	34·7 „	„	50 „	=	255·1 „
„	200 „	=	73·2 „	„	80 „	=	363·1 „

The second scale does not commence exactly where the first leaves off. The unit for scale No. 1 is 73·2 ÷ 200 = 0·366 and the scale is evidently intended to weigh up to 2 tahils (75·6 grammes). For scale No. 2 the unit is 363·1 – 72·5 = 290·6 ÷ 80 = 3·63, and the scale weighs up to, roughly, 10 tahils (378 grammes).

On scale No. 1, curiously enough, the point of equilibrium is nine points to the right of the fulcrum instead of equilibrium commencing with the first dot of the scale, confirming the statement as to the arbitrary way in which scales are put on.

The shape of the case, which is of a dark brown wood, is similar to that shown in Fig. 15, p. 204.

There is another steelyard in the collection identical in almost every respect with the above, which weighs up to 73·2 and 365·5 grammes respectively, with a P = 22·891 grammes.

A cheap form of Chinese steelyard (not figured) has the following dimensions:—Bone beam, 263 mm. long; diameter of pan, 66 mm.; poise (P) a crude flat oval piece of brass = 9·010 grammes.

Fulcrum furthest from Pan. (Shortest Scale.)	Middle Scale. (Scale 2.)	Fulcrum nearest to Pan. (Scale 3.)
P. at 0 dots = Equilibrium.	P. at 0 dots = 24·9 grammes.	P. at 0 dots = 64·5 grammes.
„ 50 „ = 3·75 grammes.	„ 25 „ = 33·0 „	„ 50 „ = 104·5 „
„ 100 „ = 7·5 „	„ 50 „ = 43·5 „	„ 100 „ = 145 „
„ 150 „ = 11·2 „	„ 75 „ = 52·0 „	„ 150 „ = 184 „
„ 200 „ = 15·0 „	„ 100 „ = 61·2 „	
„ 250 „ = 18·75 „	„ 125 „ = 70·2 „	
„ 300 „ = 22·55 „	„ 150 „ = 79·7 „	
„ 350 „ = 26·4 „		

For the shortest scale the unit is 26·4 ÷ 350 = 0·75 and the scale will weigh up to about 7 chi; for the middle scale the unit is 79·7 – 24·9 = 54·8 ÷ 130 = 0·365, and the scale will weigh up to a little over 2 tahils; for the longest scale the unit is 184 – 64·5 = 119·5 ÷ 150 = 0·79. For the first scale it will weigh up to P × 3; for the middle scale P × 9, and for the third scale P × 20.

The case is crudely cut out of bambu and is fiddle shaped.

The weighings on a second popular form of Chinese steelyard closely resembling the above works out as follows:—

Longest Scale.	Middle Scale.	Shortest Scale.
P. at 0 dots = Equilibrium.	P. at 0 dots = 22·0 grammes.	P. at 0 dots = 66·0 grammes.
„ 200 „ = 15 grammes.	„ 175 „ = 87·5 „	„ 50 „ = 105 „
„ 350 „ = 26·4 „		„ 100 „ = 144 „
		„ 150 „ = 179·5 „

The units are thus respectively 0·754, 0·374, and 0·756.

The weighings on a third cheap Chinese steelyard are as follows:—

Long Scale.	Short Scale.
P. at 0 dots = Equilibrium.	P. at 0 dots = 18 grammes.
„ 200 „ = 15·0 grammes.	„ 50 „ = 37 „
„ 350 „ = 26·2 „	„ 150 „ = 75 „

The units being respectively 0·754 and 0·38. The short scale of this steelyard differs, however, from all the others in the fact that after a series of 10 divisions of 5 dots each there is suddenly a change to 5 divisions of 5 dots each, the 5 divisions together taking up as much space as the 10 together. (See Fig. 23, p. 210.)

On looking back over the results it may be stated that the principle appears

to be that every dot should represent two huns or one hun, *i.e.*, 0·756 or 0·378 grammes.

We have also in the collection a Chinese steelyard (not figured) from Upper Burma, much worn, and with every appearance of age. The bone beam is 310 mm. long; diameter of pan, 82 mm.; poise (P) = 95· 911 grammes.

Shortest Scale.		Middle Scale.		Longest Scale.	
P. at 0 dots =	0·0 grammes.	P. at 0 dots =	185 grammes.	P. at 0 dots =	738·0 grammes
„ 50 „ =	19·5 „	„ 10 „ =	222 „	„ 1 „ =	769·2 „
„ 250 „ =	93·0 „	„ 25 „ =	277 „	„ 5 „ =	932·0 „
„ 500 „ =	185·0 „	„ 150 „ =	735 „	„ 15 „ =	1320·0 „

For the shortest scale the unit is 185 ÷ 500 = 0·37 per dot, and the scale will weigh up to 5 tahils. For the middle scale the unit is 735 − 185 = 550 ÷ 150 = 3·66, and the scale weighs up to over $1\frac{1}{5}$ kati. For the longest scale the unit is 1,320 − 738 = 582 ÷ 15 = 38·8, and weighs up to $2\frac{1}{5}$ kati. It will weigh P × 2, P × 8, and P × 14, approximately, per respective scale.

The case is black lacquered and very old; the poise is very crude and filed out of a piece of brass (Fig. 20).

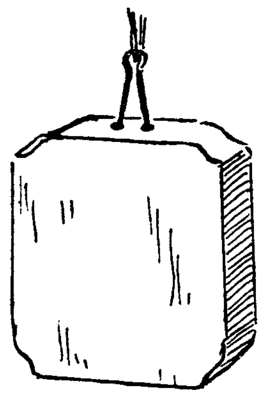


FIG. 20.—Poise of Chinese steelyard. Bankfield Museum.

A steelyard similar to the above three specimens, but provided with an equilibrium indicator, comes from Taiping in the Malay Peninsula, but it is Chinese. It has a bone beam and the same poor finish as the commoner sorts above described. The indicator is similar to that shown in Fig 11, p. 203.

When equilibrium is indicated the beam is not horizontal, but is tilted upwards at an angle of about ten degrees (10°). Mr. Leonard Wray, from whom I obtained this specimen, informs me that this peculiarity is common to nearly all the Chinese-made steelyards in the Peninsula.

Length of beam, 250 mm.; diameter of pan, 65 mm.; poise (P) = 7·052 grammes.

With Fulcrum furthest from Pan. (Shortest Scale.)		With Middle Fulcrum. (Medium Scale.)		With Fulcrum nearest to Pan. (Longest Scale.)	
P. at 0 dots =	Equilibrium.	P. at 0 dots =	21 grammes.	P. at 0 dots =	68 grammes.
„ 50 „ =	3·7 grammes.	„ 50 „ =	39 „	„ 50 „ =	105 „
„ 150 „ =	11·1 „	„ 100 „ =	58 „	„ 100 „ =	142 „
„ 250 „ =	18·5 „	„ 150 „ =	76 „	„ 150 „ =	180 „
„ 350 „ =	25·8 „				

For the first scale the unit will be 25·8 ÷ 350 = 0·737 = 2 huns, and the scale weighs up to 7 chi; for the middle scale the unit will be 76 − 21 = 55 ÷ 150 = 0·366 = 1 hun, and the scale weighs up to 1 tahil; for the third scale the unit

will be $180 - 68 = 112 \div 150 = 0{\cdot}746 = 2$ huns and the scale weighs up to 5 tahils.

In Fig. 22 I have illustrated a steelyard from the Federated Malay States; it is nicely finished and provided with equilibrium indicator (as shown in Fig. 11), which when it indicates equilibrium has the beam at an angle of about 10° above the horizontal; its dots or stars are of brass wire. It appears to have been tested by Government officials.

Length of wood beam, 690 mm.; diameter of brass pan, 164 mm.; poise (P) = 1,512 grammes.

Fulcrum furthest from Pan. (Shortest Scale.)	Fulcrum in Centre. (Middle Scale.)	Fulcrum nearest to Pan. (Longest Scale.)
P. at 0 dots = Equilibrium.	P. at 0 dots = 615 grammes.	P. at 0 dots = 3·049 kilos.
„ 16 „ = 317 grammes.	„ 16 „ = 1·209 kilos.	„ 2 „ = 3·660 „
„ 32 „ = 608 „	„ 32 „ = 1·816 „	„ 4 „ = 4·284 „
„ 48 „ = 904 „	„ 64 „ = 3·024 „	(„ 20 „ = 9·209 „ calculated).

The unit for the shortest scale is $904 \div 48 = 18{\cdot}8$, and it will weigh over $1\frac{1}{2}$ katis (907 grammes); the unit for the second scale is $3{,}024 - 615 = 2{,}409 \div 64 = 37{\cdot}6$, and it will weigh over 5 katis; the unit for the third scale is $4{,}284 - 3{,}049 = 1{,}232 \div 4 = 308{\cdot}7$, and it will probably weigh up to 15 katis (but I cannot get that quantity of weight into the scale). The unit for the third scale does not appear to be neither a fraction nor a multiple of a hun (0·378 gramme), but it is nearly half a kati or 8 tahils (302·4 grammes), which is 800 huns, and therefore a multiple of a hun, which it is probably intended to be.

The first (shortest) scale on Fig. 22, see Fig. 22A, begins with twenty dots divided into fives, which take up the same space as eight of the immediately succeeding dots and continue thus, so that what I have named dot 16 is really dot 28, and what I have named dot 32 is really 44; I have treated the scale as though the first 20 dots were 16 only. For the space occupied by the 20 dots, the unit is 158 grammes, more like a Japanese measure, being almost equal to 100 shu = 156·5 grammes.

We now come to two Japanese steelyards, Fig. 3, Plate XXIII, purchased in Yokohama, and said to be used for pharmaceutical purposes; both are provided with trapezoid shaped cases, Fig. 17; they have bone beams, tortoiseshell pans, each with three silk strands for support.

Length of beam, 152 mm.; diameter of pan, 48 mm.; poise (P) = 1·127 grammes. The scale is also divided into fives and tens.

P. at 0 dots = Equilibrium.	P. at 40 dots = 1·36 grammes.
„ 10 „ = 0·39 gramme.	„ 60 „ = 1·98 „
„ 20 „ = 0·72 „	

The unit $= 1{\cdot}98 \div 60 = 0{\cdot}033$ per dot. It looks as though the unit were

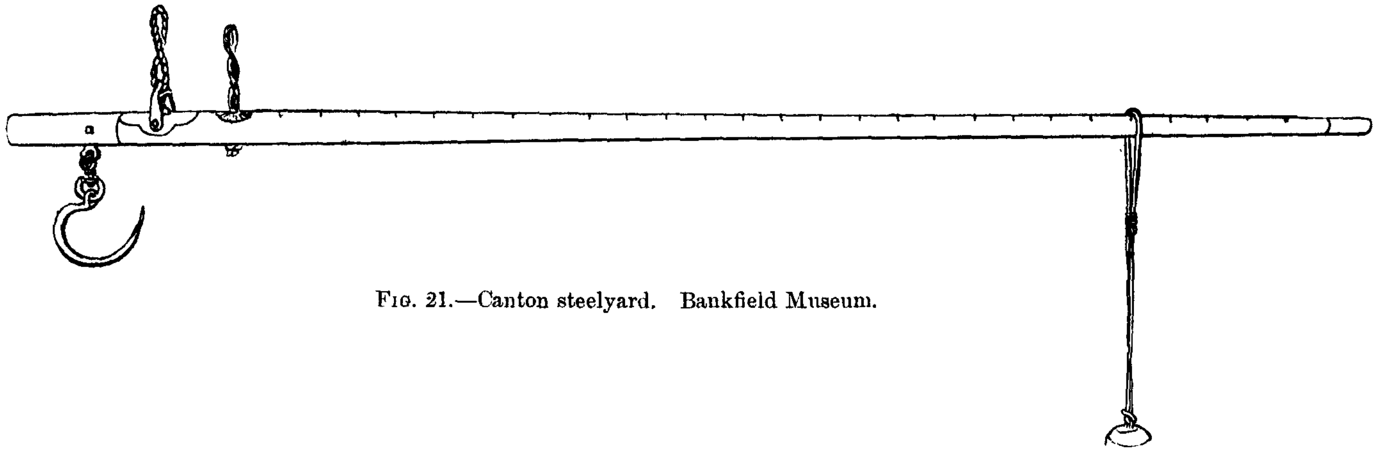


FIG. 21.—Canton steelyard. Bankfield Museum.

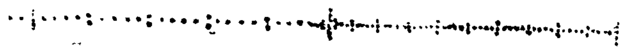


FIG. 23.—Unusual scale on Chinese cheap steelyard, see p. 207.

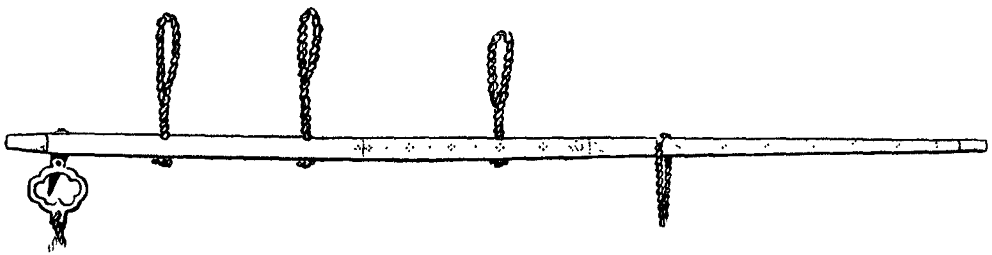


FIG. 22.—Steelyard from Federated Malay States. Bankfield Museum.

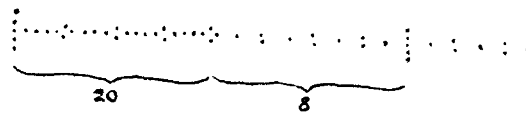


FIG. 22A.—Scale of Fig. 22.

intended to represent a tenth of a mommé for ten dots = 0·39 gramme, and the whole scale was intended to weigh up to five mommé = 1·87 grammes.

Similar to the above is another steelyard, but smaller in every way. The length of beam is 140 mm.; diameter of pan, 42 mm.; poise (P) = 0·481 grammes. The scale is also divided into fives.

P. at 0 dots = Equilibrium.	P. at 25 dots = 0·37 gramme.
„ 10 „ = 0·17 gramme.	„ 50 „ = 0·72 „

The unit is 0·72 ÷ 50 = 0·0144. Five divisions (= 25 dots) weigh 0·37 grammes, or one-tenth of a mommé, and the whole scale appears to weigh up to one-fifth of a mommé.

Professor W. Gowland, F.R.S., informs me that this type is unknown to him, and as the steelyards are intended to weigh such small quantities they were evidently used for medicines. He also says that in his time "the portable steelyards which were in use for weighing gold and silver had generally two points of suspension and two scales, and the weight placed on the beam weighed 10 mommé. The beam was of bone or ivory.

"When the poise was used with one of the suspenders and placed at 0, the beam was in equilibrium. Each division of the scale = $\frac{1}{10}$ mommé, and the scale was graduated up to 15 mommé.

"When the poise was used with the other suspender and placed at 0 it required 10 mommé to counterbalance it. Each division of the graduated scale = $\frac{1}{5}$ mommé and the graduation went up to 50 mommé."

These gold and silver scales are therefore the same in principle as the Chinese ones described above. It seems a clear deduction from the table of weights that the Japanese metrology is derived from the Chinese, and hence the close correspondence in the steelyards.

The steelyard illustrated in Fig. 1, Plate XXIII, comes from Upper Burma. It differs from those of its class in being provided with a compound weight. It consists of the usual bone beam and brass pan and has three scales. Its poise is made up of two pieces of brass, a large and a small piece, which fit together, but while the small piece can be used by itself, the large one can only be used with the small one. The large poise (P) is a flat ovoid having six shallow concavities on the front and four on the back. It has a hole (4 mm. diameter) drilled right through from top to bottom, connected with the front by a slot which runs parallel to the full length of the hole. At the lower end of the poise a rectangular piece has been cut out. The small poise (p), which consists of a rectangular block of brass, is provided with a long slender lug, the top of which has been pierced for the suspending string. This small poise fits into the large one, and when the two poises are to be put together the string is slipped through the slot so as to save the labour of pushing it up through the hole.

The length of the case is 388 mm. over all. Weight of pan about 33 grammes; weight of beam, 28·5 grammes; total weight of pan, beam, and strings, 61·5, say

62 grammes. Diameter of pan, 90 mm.; diameter of beam, 7·5 mm., tapering to 6·5 mm.; length of beam, 306 mm. Total movable poise with strings = 50·2 grammes = P + p = double power. Small movable poise with strings = 6·0 grammes nearly = p = single power. String = about 0·2 gramme. Large poise (P) = 44·2 grammes. The full-sized drawing of the beam is seen in Fig. 6, Plate XXIV, Nos. 1, 2, and 3.

B. Point of attachment of pan. C, D, E. Three fulcrums with string and bobs for holding the steelyard when weighing. G. Centre of gravity of beam with bobs. N. Point of commencement of second scale No. 2. R. Point of commencement of third scale No. 3.

Fulcrum at C. (Scale No. 1.)

p.

At F.	0 dots	= 456 grammes	= p ×	76
„ H.	10 „	= 509 „	= p ×	85
„ K.	20 „	= 551 „	= p ×	92
„ L.	30 „	= 601 „	= p ×	100

The unit = 601 − 456 = 145 ÷ 30 = 4·83

p + P.

741 grammes	=	(p + P) ×	14·7
1,134 „	=	„ ×	22·6
1,517 „	=	„ ×	30·2

The unit = 1,517 − 741 = 776 ÷ 20 = 38·8

Fulcrum at D. (Scale No. 1.)

p.

At E.	0 dots	= 125·0 grammes	= p × 21
„ H.	10 „	= 141·5 „	= p × 23·6
„ K.	20 „	= 158·0 „	= p × 26·3
„ L.	30 „	= 174·0 „	= p × 29

The unit = 174 − 125 ÷ 30 = 1·63

p + P.

= 205 grammes	=	(p + P) ×	4·1
= 341 „	=	„ ×	6·8
= 481 „	=	„ ×	9·5
= 620 „	=	„ ×	12·3

The unit = 620 − 205 ÷ 30 = 13·8

Fulcrum at E. (Scale No. 1.)

p.

At E.	0 dots	= 0 grammes	= p × 0
„ H.	10 „	= 6 „	= p × 1
„ K.	20 „	= 12 „	= p × 2
„ L.	30 „	= 18 „	= p × 3

The unit = 18 ÷ 30 = 0·6

p + P.

= 0 grammes	=	(p + P) ×	0
= 50·2 „	=	„ ×	1
= 98·0 „	=	„ ×	2
= 148·0 „	=	„ ×	3

The unit = 148 ÷ 30 = 5

Fulcrum at C. (Scale No. 2.) 420 grammes in pan to produce equilibrium without weight.

p.

At N.	0 dots	= 454	= p × 76
„ O.	50 „	= 519	= p × 86·5
„ P.	100 „	= 569	= p × 95

The unit = 569 − 454 ÷ 100 = 1·15

p + P.

696 grammes	=	(p + P) ×	13·9
1,210 „	=	„ ×	24·2

The unit = 1,210 − 696 ÷ 50 = 10·3

Fulcrum at D. (Scale No. 2.) 115 grammes in pan produces equilibrium without weight.

p.			p + P.		
At N. 0 dots	= 125 grammes	= p × 21	= 186 grammes	= (p + P)	× 3·7
„ O. 50 „	= 142·5 „	= p × 24	= 370 „	= „	× 7·4
„ P. 100 „	= 159 „	= p × 26·5	= 558 „	= „	× 11·1
„ Q. 150 „	= 176 „	= p × 29·3	= 731 „	= „	× 14·5
The unit = 176 − 125 ÷ 150 = 0·34			The unit is 731 − 186 ÷ 150 = 3·63		

Fulcrum at C. (Scale No. 3.)

p.			p + P.		
At R. 0 dots	= 461 grammes	= p × 78	762 grammes	= (p + P)	× 15·2
„ S. 50 „	= 479 „	= p × 80	895 „	= „	× 17·8
„ T. 150 „	= 510 „	= p × 85	1,179 „	= „	× 23·5
„ U. 250 „	= 542 „	= p × 90	1,477 „	= „	× 29·4
„ V. 350 „	= 580 „	= p × 97			
„ W. 450 „	= 617 „	= p × 103			
The unit = 617 − 461 ÷ 450 = 0·346			The unit = 1,477 − 762 ÷ 250 = 2·86		

Fulcrum at D. (Scale No. 3.)

p.			p + P.		
At R. 0 dots	= 125 grammes	= p × 21	209 grammes	= (p + P)	× 4
„ S. 50 „	= 132·7 „	= p × 22	257·5 „	= „	× 5
„ T. 150 „	= 143·5 „	= p × 24	365 „	= „	× 7
„ U. 250 „	= 157 „	= p × 26	470 „	= „	× 9
„ W. 450 „	= 181 „	= p × 30	777 „	= „	× 15
The unit = 181 − 125 ÷ 450 = 0·124			The unit = 777 − 209 ÷ 450 = 1·25		

Fulcrum at E. (Scale No. 3.)

p.			p + P.		
At S. 50 dots	= 2·7 grammes	= p × 0·45	= 19·0 grammes	= (p + P)	× 0·39
„ T. 150 „	= 7·5 „	= p × 1·25	= 75·7 „	= „	× 1·5
„ U. 250 „	= 11·5 „	= p × 2·0	= 93·5 „	= „	× 1·8
„ W. 450 „	= 20·4 „	= p × 3·6	= 166·5 „	= „	× 3·3
The unit = 20·4 − 2·7 = 17·7 ÷ 450 = 0·039			The unit = 166·5 − 19 = 147·5 ÷ 450 = 0·32		

The poises p and p + P will, as a matter of course, at the various positions, like the simple poises of other steelyards, weigh a multiple of their own weight, but for practical purposes such measurements should be whole numbers only, and not fractions or decimals unless we except halves.

With scale No. 1, fulcrum E, both single and double power weigh out exact multiples of their own weight, but neither the weight at any given division nor the unit can be said to be in accord with any divisor of the Chinese measures. With the same scale and fulcrum D we do not get whole numbers, neither again are the results recorded in Chinese measures.

With the same scale, but fulcrum at C, we have very similar results. While the single power weighs up to 1 kati, the unit is not a distinct Chinese measure, the nearest approach to 483 being 491 = 13 tahils. It commences to weigh at 12 tahils and rises to 1 kati (604 grammes), but the intermediate divisions at 10 dots and 20 dots give fractions which cannot be intended. For the double power it commences to weigh at 20 tahils, and as far as we dare risk its strength, it weighs up to 40 tahils (1,513 grammes); the unit is also 10 tahils, so that it seems with scale No. 1 and fulcrum C the double power is intended to be used. On the other hand, we are met with the difficulty that the scale is not strong enough to carry much more than 1,500 grammes, while theoretically it should carry 500 more. With scale No. 2 the fulcrum at E is out of the question, and with the fulcrum at D or C we have similar anomalies as with scale No. 1 and double power, although with the fulcrum at D we get an approach to the Chinese measure in the result 363, which is probably intended to represent 378 = 10 tahils.

With scale No. 3 and any of the fulcrums C, D, or E, we have the same difficulty.

It is noteworthy that for the single power with the different scales and fulcrums there is no continuity at all, while there is continuity between scale No. 1, fulcrum E, double power, giving multiples of 1, 2, and 3, and scale No. 3, fulcrum D, double power, giving multiples of 4, 5, etc., up to 15, and, perhaps, with scale No. 1, fulcrum C, double power, 15 to 30.

There seems to be no simple ratio between the small power (p = 6·0 grammes) and the double power (p + P = 50·2 grammes).

One of the objects of the double power seems to be that we can get a multiple of the weight used (expressed in the term of the Chinese measure of weight), while we do not get this with the use of the single-power poise.

The results of the double-power poises tabulate as follows:—

		Range (in Grammes).		Unit.	
Fulcrum at—	Scale No.	Single Poise. p.	Double Poise. p + P.	Single Poise. p.	Double Poise. p + P.
C.	1	456 – 601	741 – 1,517	4·83	38·8
C.	2	454 – 569	696 – 1,210	1·15	10·3
C.	3	461 – 617	762 – 1,477	0·346	2·86
D.	1	125 – 174	205 – 620	1·63	13·8
D.	2	125 – 176	186 – 731	0·346	3·63
D.	3	125 – 181	209 – 777	0·124	1·25
E.	1	0 – 18	0 – 148	0·6	5·0
E.	3	2·7 – 20·4	19 – 166·5	0·039	0·32

It seems that the double poise is intended to continue on the same scale where the limit of the single poise is reached. Comparing the second and third columns of the table there is in most cases rather a considerable gap, but in as many instances the third column is evidently a continuation of the second, *e.g.*, in the last five lines.

It is also evident that the range of weights covered on the three different scales is the same when the same fulcrum is used. For example, using fulcrum D and any of the scales we can use the steelyard for weights from 125–177 grammes; using C we can weigh from 454–1,517 grammes. With the three fulcrums we can weigh from 0–1,517 grammes. There is some overlapping of weights between C, D, and E, but not very much.

By referring to the units the object of having three scales covering the same range of weights can be seen. In each case the unit of the first scale is big compared with the unit of the second scale, and this is big compared with the third scale. So we should use the first scale for approximate weighings, and the second and third for more accurate work.

Take one or two examples. Suppose we wanted to get a big weight, approximately, use C 1, double poise. To get the same weight accurately use C 3, double poise. For an accurate small weight use E 3, single poise, etc.

The smallest unit 0·039 might be intended for 1 ti, but there does not seem to be any obvious connection between the other units and the Chinese measures of weight.

In Fig. 9, p. 202, we have another illustration of a steelyard with a double power. It is a Chinese steelyard nicely finished, closely resembling the one illustrated in Fig. 7, Plate XXIV. The poises, although of a different form, are fitted together in the same method as in the steelyard, Fig. 1, Plate XXIII.

Length of beam, 166 mm.; diameter of brass pan, 38 mm.
Small brass poise (p) (with thread) = 0·532 grammes.
Large brass poise (P) (alone) = 4·732 „
p + P (double power) = 5·264 „
or p + P = 10 × p.

As in the other steelyard, the large weight is not used by itself, but only in conjunction with the small weight.

Scale No. 1.

p.		p + P.	
At 0 dots	= Equilibrium.	At 0 dots	= Equilibrium.
„ 50 „	= 0·4 grammes.	„ 50 „	= 4·0 grammes.
„ 250 „	= 1·87 „	„ 250 „	= 18·5 „

With p only the scale weighs up to 5 huns, and the unit is 1·87 ÷ 250 = 0·0748. With p + P the scale weighs up to 5 chi, and the unit is 0·0748.

Scale No. 2.

p.				p + P.			
At	0 dots	= 5·9	grammes.	At	0 dots	= 18·5	grammes.
„	50 „	= 6·5	„	„	50 „	= 37·0	„
„	100 „	= 9·6	„	„	100 „	= 55·0	„

With the single power the scale weighs up to about $2\frac{1}{2}$ chi, and the unit is 0·037; with the double power the scale weighs up to about $1\frac{1}{2}$ tahils, and the unit is likewise 0·37.

While with scale No. 1 the double power weighs ten times as much as the single power, with scale No. 2 the double power weighs about 5·7 times as much as p only, which is practically an impossible figure, and hence the conclusion may be drawn that p only is not intended to be used on scale No. 2.

In this steelyard, Fig. 9, we have, using the first scale, the single poise for weighing accurately up to 1·87 grammes—the unit being 0·00748 ($\frac{1}{5}$ ti), and the double poise to continue the weighings up to 18·5 grammes, but not so accurately—the unit now being 0·0748 (or 2 ti). Using the second scale and the single poise we can get weights from 6–10 grammes accurately (unit=1 ti), and with the double poise we can continue with less accuracy up to 55 grammes (unit=1 hun).

A fancifully ornamented steelyard, illustrated in Fig. 24, comes from Upper Burma. Length of beam 1·14 metre. The scale is curiously divided, and I have not been able to get any explanation as to the reason of the division. It does not tally

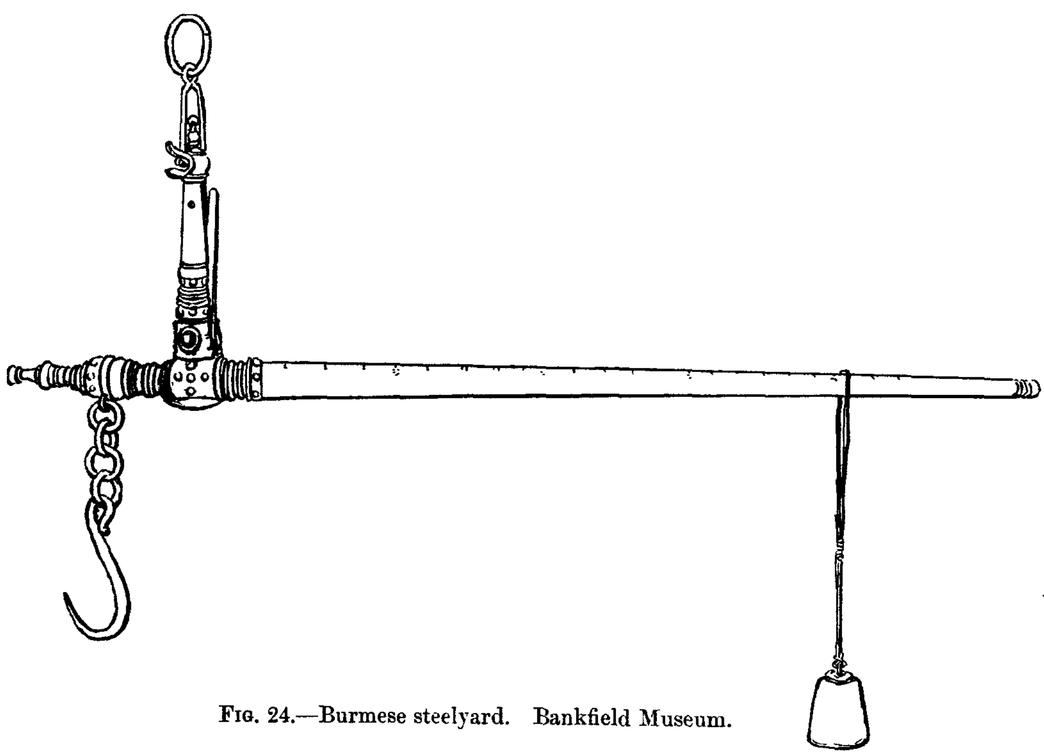


FIG. 24.—Burmese steelyard. Bankfield Museum.

with Chinese measure. This scale, Fig. 25, consists of six large divisions divided into five lesser ones, and these are again divided into two smaller ones, which are lastly divided into two smallest, so that the main divisions are practically divided into twenty subdivisions. The beam is in equilibrium with 15 katis on the initial main division, and rises by 15 katis for each one, or 0·75 kati per smallest subdivision.

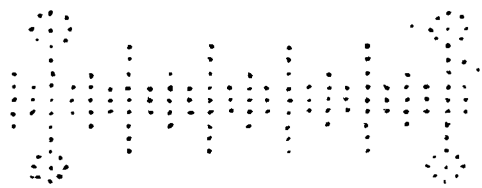


FIG. 25.—Scale on steelyard Fig. 24.

From Canton we have in Bankfield Museum a large steelyard, Fig. 21, p. 210, 1·80 m. long, made of hard strong wood with one fulcrum of cord only, which perforates the beam and is fixed by a knot, and another fulcrum made of brass, which hinges on the beam. It is provided with two corresponding scales, and the unit is 1 and 5 katis respectively.

There is also at Bankfield a large steelyard from Perak, and like all the steelyards from that district, it is of Chinese make. It is of wood with brass caps at either end, but provided with iron fittings for the fulcrum as well as for the hook. The indicator is about 10 degrees out of the perpendicular, as in all others from the Malay Peninsula. It is Government stamped, and is marked 50, 100, 150 (katis), which is an innovation of recent years in steelyards. It is provided with two scales (rows of dots), one on each side, and exactly alike, so that the weight can be read off by any one standing on either side, and is a great improvement on the single row of dots, usually on top or as close to the upper side of the beam as possible.

Length of beam 1·70 metre.

It starts weighing at 50 katis and goes up to 200 katis, the unit being $200 - 50 = 150 \div 150 = 1$ kati $= 604$ grammes.

Of the Malay steelyards, Mr. Wray informs me that they are made by Chinamen, and that before the year 1893, when the Malay weights were adjusted, they were also made by Chinamen. "The beams are made of a hard wood called *mungapus* or *lengapus*. They are not turned in a lathe, but are worked into shape by sawing the wood into lengths of square sections, then reducing these with an axe to nearly the size and shape intended and finished off with small planes, the blades of which are curved like those used in England for beadwork.

"The makers have standard weights, and the large divisions are marked off by their use, the smaller by subdivision. For instance, the maker puts a kati weight in the pan and slides the poise he intends to use with the particular steelyard to and fro until it balances. This gives the one kati mark. He then takes a 2-kati

weight, and so gets the 2-kati mark. The space between these marks he divides into sixteen parts, which gives him tahils and so on.

"The beam having been marked out, a man takes it, and with the aid of a small pump drill makes a series of holes along the lines. This work is done very rapidly and skilfully, a few strokes up and down of the wooden crosspiece only being required for each hole. The holes are about $\frac{1}{8}$ inch (3 mm.) deep, and a short length of brass wire is driven into each hole with a light hammer, and cut off close. The whole is then finished off with a fine file."

Before leaving the steelyards I must call attention to a very curious one, Fig. 26, which has been in Bankfield Museum a long time, but the *provenance* of which is quite unknown, although it is evidently of Chinese origin. The beam and the hooks are of a very hard wood, apparently similar to that of the large Chinese and

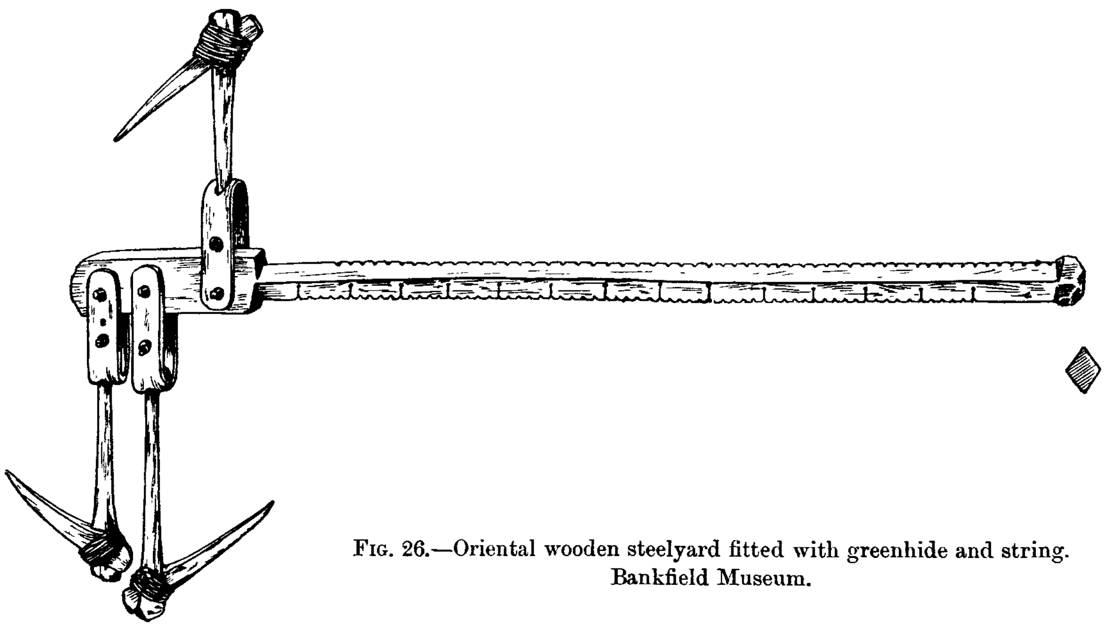


FIG. 26.—Oriental wooden steelyard fitted with greenhide and string. Bankfield Museum.

Malay steelyards. The beam is diamond shaped in section and has notches instead of the usually inserted brass dots, and the system is decimal; it is 520 mm. long. The hooks are formed of two pieces of wood of unequal length tied together by cotton string at the thicker end, at an angle of about 45°; at the end of the longer piece there is a knob which has been pushed through a hole cut into the middle of a strip of greenhide. This must have been done when the greenhide was still new and flexible. The greenhide is bent double, and the two arms thus formed are attached to the beam by a small tough wooden pin which goes right through the beam. Above the pin the two arms are joined by a very thin strip of greenhide, to prevent their spreading out and slipping off the pin. There is no pan and no poise with it—both missing.

The fulcrum for both scales is placed below the level of the pin of the hook

on which the load is placed, and hence equilibrium is so unstable that it is quite impossible to weigh anywhere approximately correct, and there is a further difficulty in the friction which exists between the greenhide and the pins. But in so far as I could manage it, with the scale marked with the notches wider apart, it starts with 1 kati and weighs up to 4 katis at the 60th notch, so that the unit would be $4 - 1 = 3 \div 60 = 0{\cdot}05$, or if we take the larger divisions, of which there are six, it would be half a kati for every one. This steelyard in use would be a splendid instrument if anyone wants a, what a Yorkshireman understands by the word, "fratch."

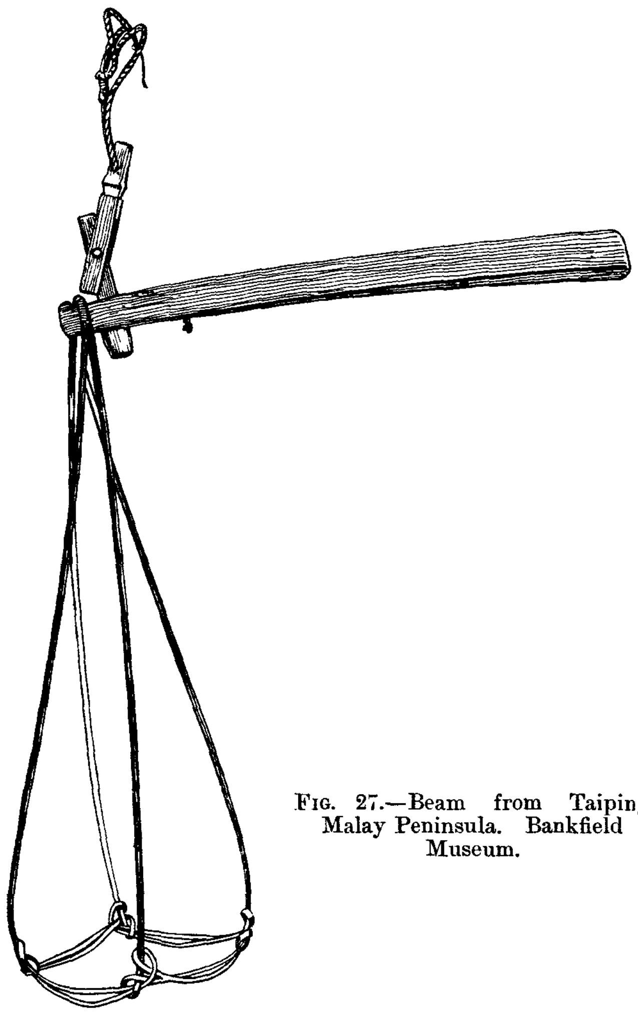


FIG. 27.—Beam from Taiping, Malay Peninsula. Bankfield Museum.

Fig. 27 represents a large bismar from Taiping, Malay Peninsula. It consists of a beam A, Fig. 28, the fulcrum post B, and the support C. When the left-hand side of the support C corresponds to the marks N on top of B it indicates the *measure* of the load.

This bismar is used for weighing padi (unhusked rice), and according to information given to me by Mr. Leonard Wray is graduated by putting a known

quantity of padi in a basket which forms the scale pan, and then cutting a notch in the wood showing the angle the beam makes with that load. This example is graduated to weigh gantangs—a Malay gantang closely corresponding to an English gallon measure (4·5 litres). It should be borne in mind that a gantang is not a weight but a measure. This instrument is not known in the provinces of Selangor and Negri Sembilan. There are fancy letter weighing scales, Fig. 29, used in England, made on the same principle as this. Mr. Wray also informs me that in the Taiping Museum, Perak, there is a steelyard similar to this, but larger, which is provided with a wooden weight which is movable along the beam in the same way as in the Chinese steelyard. "There are four or five marks on the top of the beam to show where to put the string of the weight, but there are no figures to indicate the weight." This specimen appears to connect bismars with steelyards.

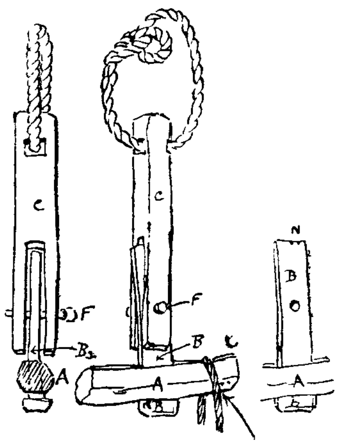


FIG. 28.

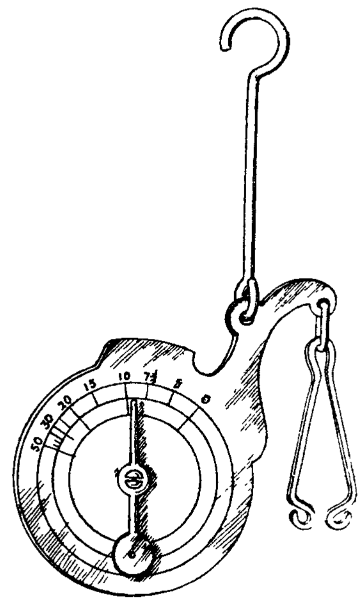


FIG. 29.—French letter - weighing scale. In use in 1869. Bankfield Museum. ½ diam.

The bismar from Perak, Malay Peninsula, shown in Fig. 30, is made of a stout piece of wood 495 mm. long, 38 mm. diameter at the thick end, and 26 mm. diameter at the thin end. Equilibrium (Eq), Fig. 31, is 275 mm. from the thick end; the basket or pan is attached at a point 70 mm. from the thin end, and between this end and Eq are 6 badly made notches at irregular intervals instead of at proportionately decreasing periods. For instance, the distance between Eq and G is 37 mm.; G and H, 27 mm.; H and K, 13 mm.; K and L, 10 mm.; L and M, 14 mm.; and M and N, 11 mm.

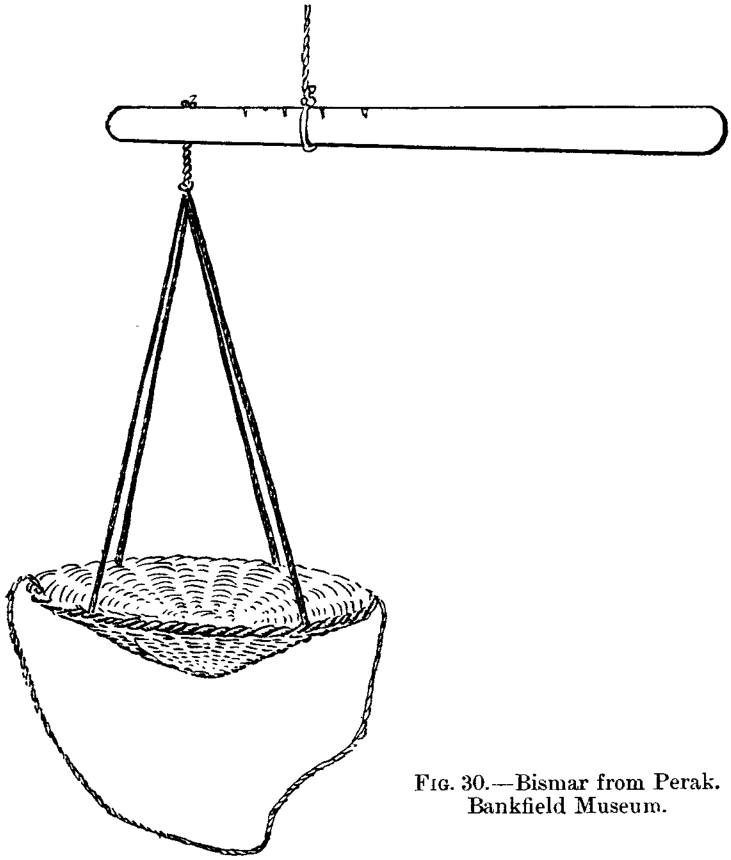


FIG. 30.—Bismar from Perak. Bankfield Museum.

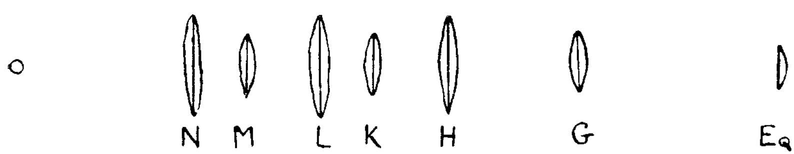


FIG. 31.—Scale on bismar, Fig. 30.

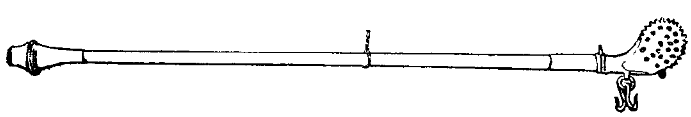


FIG. 32.—Malabar bismar. Bankfield Museum. For details of scale see Fig. 33, Pl. XXIV.

The weights carried are

Fulcrum at E. = 0 grammes.	Fulcrum at L. = 709 grammes.
„ „ G. = 166 „	„ „ M. = 1·073 kilos.
„ „ H. = 383 „	„ „ N. = 1·432 „
„ „ K. = 506 „	

The unit is 1,432 ÷ 6 = 238, which is neither a fraction nor a multiple of a kati, and may possibly be some purely local measure. But I am inclined to think that the weight at G, 166 grammes, is intended to be 189 grammes, or half a tahil, and at H, 378 grammes, or one tahil, and after this the scalemaker has got hopelessly wrong.

The Malabar bismar, Fig. 32, in Bankfield Museum, is somewhat different from that described by Mr. Thurston below. It has not the two regulating pins, and the divisions do not appear to be the same—the subdivisions being very irregular. Length, 700 mm. The dots of the scale look very much like Chinese work. The supporting string (the movable fulcrum) cannot be moved easily, as when pushed along that part of the string which goes round the beam is apt to twist and stick. It weighs as follows. (See Scale, Fig. 33, Plate XXIV):—

Fulcrum at A. = 158 grammes.	Fulcrum at E. = 3·827 kilos.
„ „ B. = 768 „	„ „ F. = 6·537 „
„ „ C. = 1·587 kilos.	„ „ G. = 8·165 „
„ „ D. = 2·268 „	

The unit will be 8·165 ÷ 7 = 1·166 kilos. = 100 tolas. It weighs up to 50 palams (100 palams = 35 lbs. = 15·867 kilos.) or 700 tolas (14 tolas = 1 palam).

This Indian bismar is thus described by Mr. E. Thurston:—"In Malabar there is used for weighing an instrument fashioned on the principle of the Danish steelyard. The yard, which is made of a hard wood, is about 4 feet long, and tapers from about 1⅛ inch in the middle to ¾ inch at the ends. It is finished off at the heavy end with a loaded brass finial simply ornamented with concentric rings, and the hook end terminates in a piece of ornamental brasswork, resembling the crook of a bishop's pastoral staff. The sliding fulcrum is simply a loop of coir (coconut fibre) string. The graduation marks, which are not numbered, are small brass pins let into the upper surface of the yard along the middle line, and flush with it. The principal graduations are each made of five pins disposed in the form of a small cross, and single pins serve for the intermediate graduations. Corresponding to each graduation mark on the upper surface of the yard there is a pair of brass pins on the middle line of each side, the pins of each pair being at a distance apart just sufficient to allow the string of the loop to lie between them. The object of these pins is to ensure that, when the instrument is in use, the loop may be accurately in a vertical plane through the graduation mark. The unit of weight employed is the palam of about 14 tolas, and the instrument is graduated from 1 to 100 palams (about 35 lbs. = 15·87 kilos.). The last three graduations

representing 80, 90, and 100 palams, come upon the brasswork, and are marked by notches instead of pins. The graduation, corresponding to 100 tolas, has, in addition, a brass point about ½ inch long, resembling the tongue of a small balance. The whole instrument is ornamental in design, and for a weighing machine of this class is fairly accurate, the sensibility being large on account of the considerable length of the yard.

"In a more simple form of weighing beam, used by native physicians and druggists in Malabar, the bar is divided into kazhinchi (approximately tolas) and fractions thereof,' and the pan is made of coconut shell." (*Bulletin*, Madras Government Museum, 1901, vol. iv, No. 2, p. 125.)

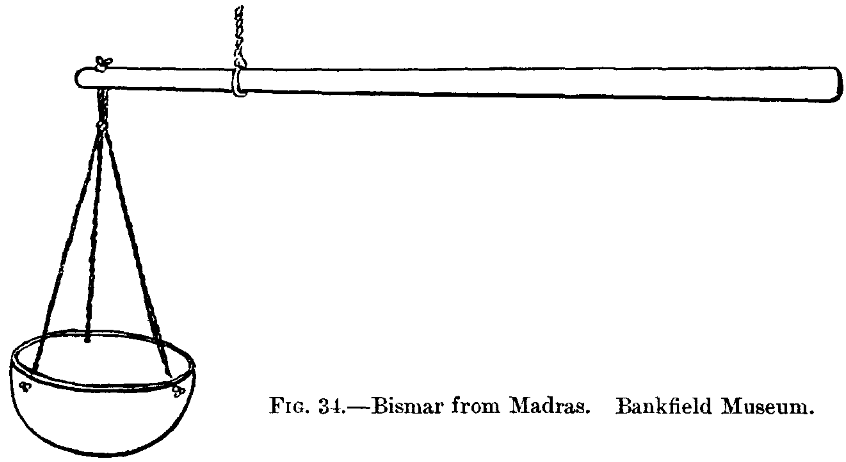


FIG. 34.—Bismar from Madras. Bankfield Museum.

Fig. 34 illustrates a bismar with coconut pan from Madras. Length of beam 596 mm. It weighs out as follows:—

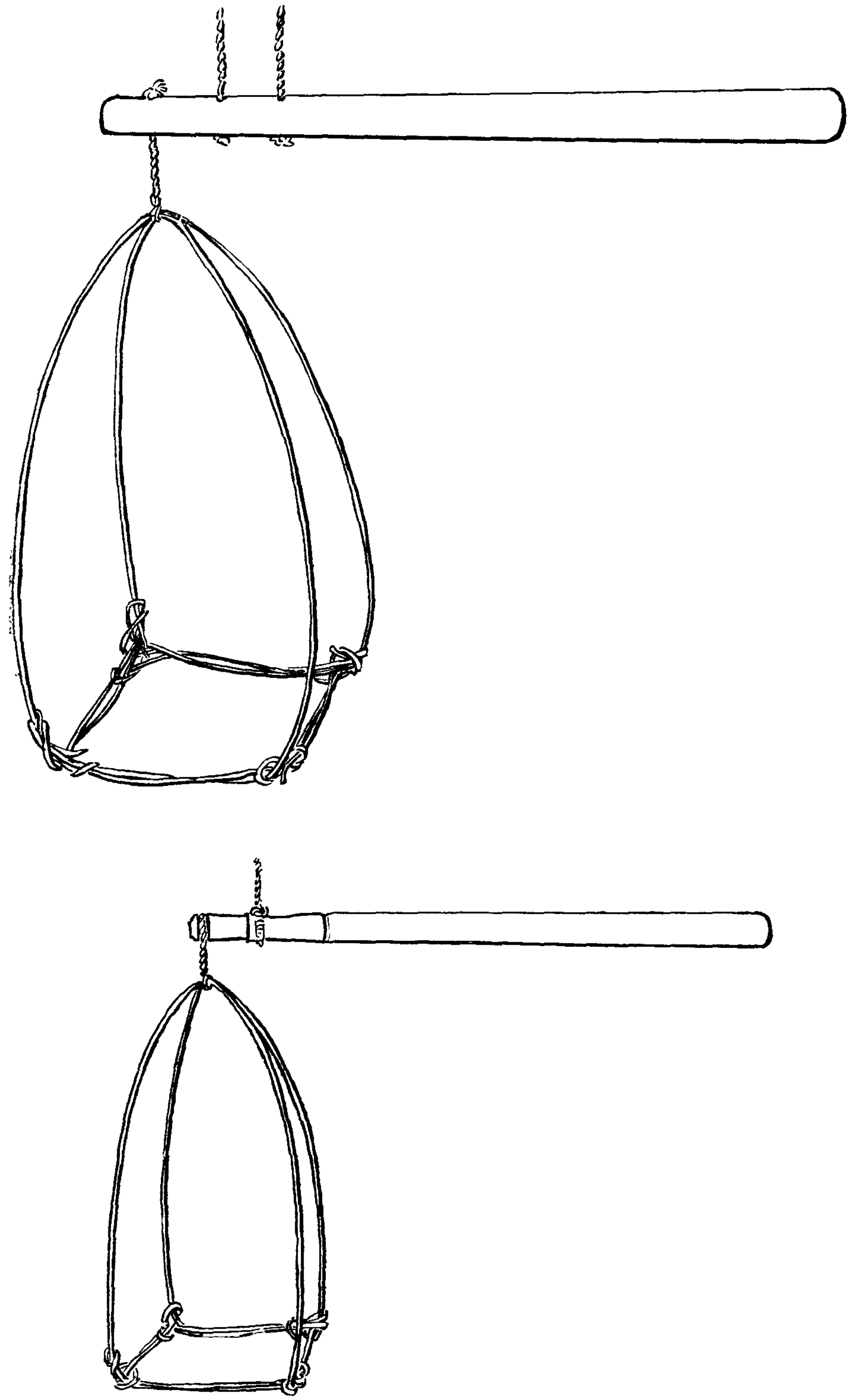
Fulcrum at E. =	0 grammes.	Fulcrum at d =	106·5 grammes.
" " a =	69·0 "	" " e =	118·5 "
" " b =	84·0 "	" " f =	130·0 "
" " c =	91·5 "		

so the unit is 130 − 69 = 61 ÷ 6 = 10·2 grammes, but if the divisions represent tolas, then the unit should be 11·3 grammes.

Fig. 35 illustrates a bismar from Biserat, Patani, Malay Peninsula, brought home by Mr. W. W. Skeat, for weighing cotton or tobacco; its beam is 320 mm. long and it is provided with two fulcrums, one to weigh half a kati and one to weigh 1 kati.

It forms a sort of connecting link or point of departure between steelyards and bismars, for it has fixed fulcrums but no travelling poise.

Fig. 36 shows a bismar brought from the same district by the same explorer, used for weighing prawn condiment (*blachan*). Length of beam 362 mm. It is provided with three notches and weighs 60, 120, and 180 grammes respectively.



FIGS. 35 and 36.—Bismars from Patani, Malay Peninsula.

For the sake of comparison I give an illustration, Fig. 37, of an English bismar now in the museum of the Hall i' th' Wood at Bolton, by kind permission of Mr. Thomas Midgley, the Curator. Length, 540 mm. The scale is made by means of headless nails driven into the beam; their position is not in accord with the amounts weighed in lbs., pointing perhaps to drying and contraction of the wood, but more probably to the dotting being originally incorrect or relating to some local weights in use. In European bismars the scale is placed underneath the beam, but in Oriental ones it seems to be always on top.

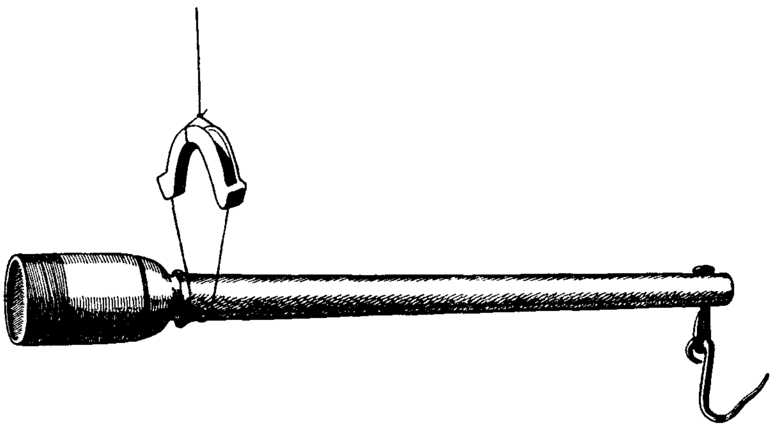


FIG. 37.—English bismar. Hall i' th' Wood Museum, Bolton.

Beyond occasional references I have not been able to find anything much written about steelyards, and of bismars there appears to be, with one exception, as great a dearth of literature as there is of steelyards. The one exception is a notable one. It is a very interesting and well-illustrated paper by Herr H. Sökeland, published in the *Verhandl. d. Berliner Anthrop. Ges.*, meeting of May 19th, 1900. An anonymous translation of this paper appeared in the *Smithsonian Rep.* for 1900, pp. 551–64, Washington, under the heading "Ancient Desemers or Steelyards." This is an unfortunate heading, for as Herr Sökeland emphasizes the difference between the bismar (desemer)—the instrument with the movable fulcrum—and the steelyard—the instrument with the movable poise—it is incorrect to give these instruments alternative nomenclature. Apart from the footnotes, the translator adds matter which does not appear in the original, but which the reader is naturally induced to believe is there. As to the origin of the balance and bismar, Herr Sökeland thinks both inventions date from primitive times and were made by different peoples at different dates, also that the invention was easily made. He thinks the idea was obtained from the yoke of a carrier who would soon learn that to get a balance both ends must be equally weighted. This may be so, but anthropologists, who know how very slowly progress is made, are not likely to agree with him that the invention was an easy one. It is difficult to judge whether the bismar, steelyard, and balance had more than one origin each,

for the bismars as well as the other two instruments must of necessity be much alike in their primitive form, until such times when a higher civilization introduces variations and complexities. The bismar is the simplest of the three, and it is possible that the steelyard and the balance grew out of it. That there is a close relation is very evident—it cannot be otherwise—and two specimens in the British Museum confirm this. The one, Fig. 38, represents a weight measurer consisting of a beam with fulcrum in the centre, with a pan at one end and a fixed weight at the other. To all intents and purposes it looks like a balance with one of the pans removed, but it is the most primitive form of bismar with fixed fulcrum and fixed poise. The other instrument, Fig. 39, is a balance with notches cut on the one arm of the beam into which fits a movable poise, so that it is a balance and steelyard in one.

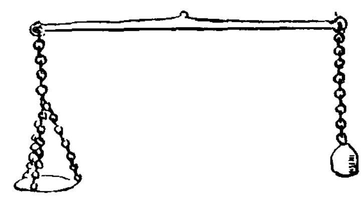


FIG. 38.—Roman bismar. British Museum.

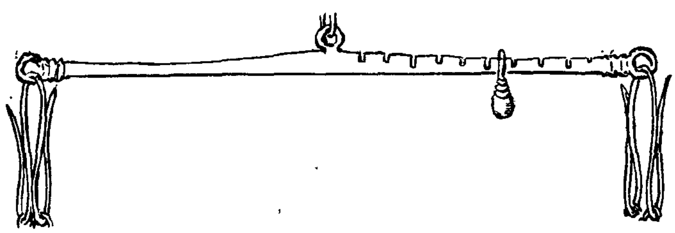


FIG. 39.—Roman balance. British Museum.

Herr Sökeland gives illustrations of and refers to bismars in Germany, Russia, Bhutan, Thibet, "the Himalayas," as well as to the Roman bismar, but he does not mention the bismar as formerly in use in England, nor does he refer to the Scandinavian instrument. In connection with the use of the latter in the Faroes, Mr. N. Annandale has some interesting remarks. He writes of a "*Wooden* weighing beam with fixed weights—a characteristic Scandinavian implement, which reappears in a slightly different form after a gap of much intervening territory, in regions so remote as India and Siam. The weight it records is usually so inaccurate that its employment in commercial transactions has long been forbidden by Danish law, but in the Farish villages most of the households still use it, for their own satisfaction, in preference to any more elaborate type of steelyard or other weighing machine" (p. 20). ". . . In the Faroes the machine almost invariably employed in weighing is the wooden beam to which reference has already been made; but in Iceland, where people ridicule the idea of a wooden beam, a steelyard with movable weights, which may in rare cases be made of stone, is used" (p. 192). ". . . In the Faroes the indicator of the weighing beam is frequently a semicircle of sheep's horn suspended by a piece of whale's sinew" (p. 192, *The Faroes and Iceland*, London, 1905).

As we have shown, the bismar is also found in the Malay Peninsula and Madras; it is probably also in use in Southern India.

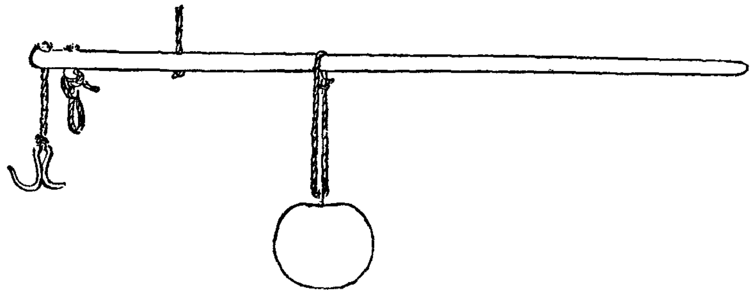


FIG. 40.—Steelyard from Yarkand. Indian Museum, South Kensington.

FIG. 41.—Roman steelyard. In the possession of Professor W. Flinders Petrie, F.R.S.

A Yarkand steelyard shown (by kind permission of Mr. Stanley Clarke) in Fig. 40, in the Indian Museum, South Kensington, is of the usual Chinese type. It is provided with two scales (rows of dots) on a wood beam 73 cm. long; it has also a granite poise weighing approximately 1·37 kilogrammes.

Mr. W. Woodville Rockhill reports the steelyard from Thibet. He says that the Chinese money scales (*Jama*) are used by the Thibetans and in Mongolia; he illustrates the ordinary Chinese steelyard above described, and also a rough copy of such an instrument made in Thibet at Taichinar Tsaidam: "In the latter the wooden beam is roughly indented to indicate ounces, tenths, and hundredths of ounces (in Thibetan called *srang, djo,* and *karna*), instead of a brass tray, one of buckskin suspended by horse hairs is used, and the weight is a bullet roughly flattened out. These scales fit in a wooden trough roughly whittled out by a knife" ("Notes on the Ethnology of Thibet," *Report U.S. Nat. Mus.*, 1893, p. 719). Anything cruder than the Thibetan copy can hardly be imagined.

As regards the steelyard (and presumably the bismar), Dr. L. W. King

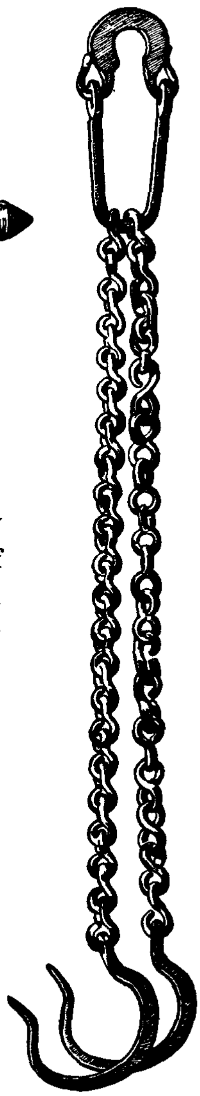


FIG. 41A.—Chain belonging to steelyard Fig. 41.

informs me the Babylonians did not possess it; nor, according to Professor Flinders Petrie, did the Egyptians possess it until Roman times. The Greeks seem to have had the ordinary two-pan balance only (*Brit. Mus. Guide to Greek and Roman Life*, London, 1908, p. 149). The Romans had various forms. The one from

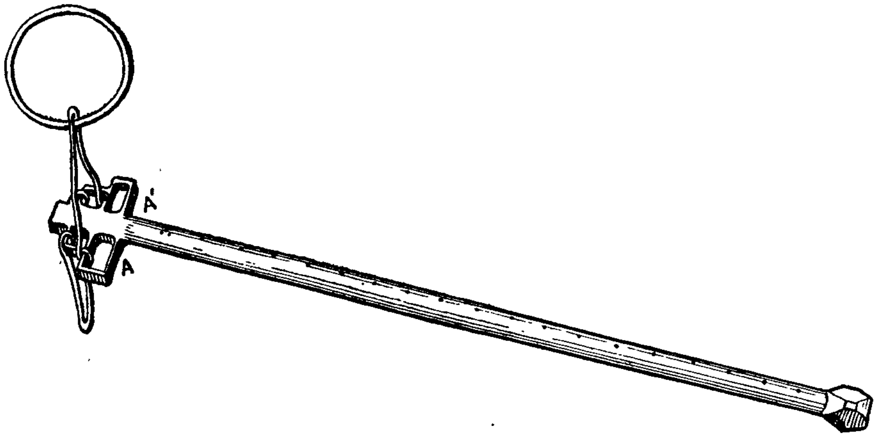


FIG. 42.—Roman steelyard in the possession of Professor Flinders Petrie. Length 223 mm. It is probable there was another link at A A'.

Egypt, illustrated in Fig. 41, in the possession of Professor Flinders Petrie, is provided with a special arrangement of double chains and hooks, Fig. 42, apparently for use with heavy articles; the poise is missing. He also possesses a beautifully finished Arabic steelyard, probably fourteenth century, shown in Fig. 43, with details, Figs. 44 and 45.

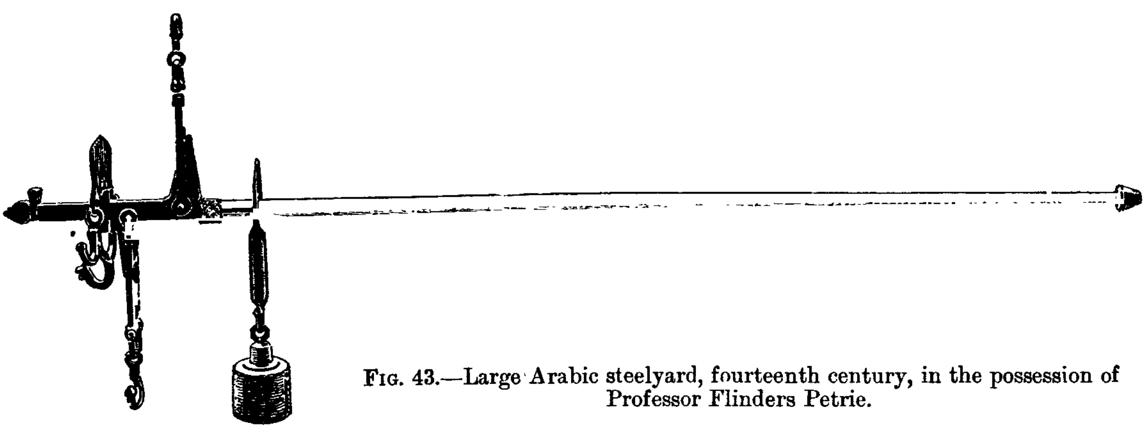


FIG. 43.—Large Arabic steelyard, fourteenth century, in the possession of Professor Flinders Petrie.

The South European steelyards, while they cannot, of course, differ in principle from the extreme Oriental article, differ very considerably in make, being generally of iron (or steel?).

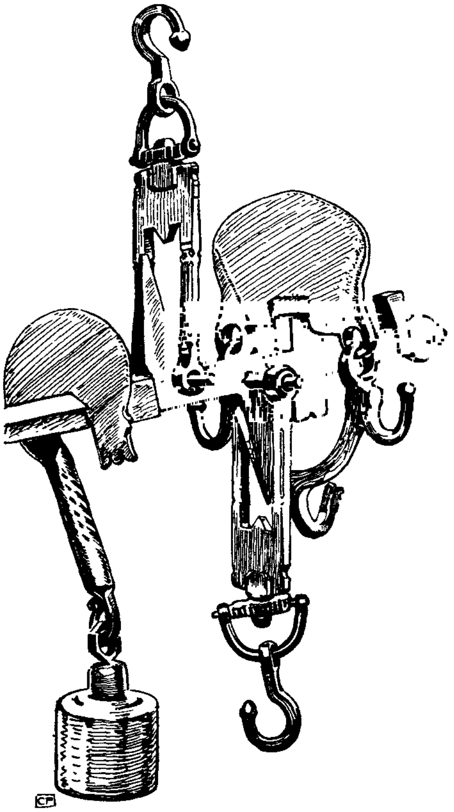


FIG. 44.—Details of Fig. 43.

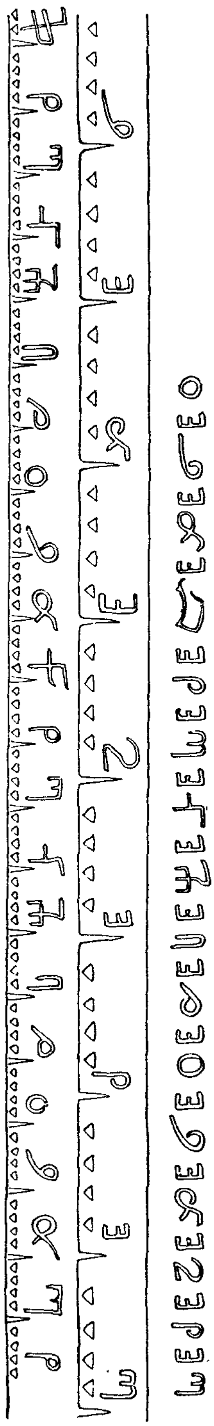


FIG. 45.—Inscription on Fig. 43. The two top rows show the divisions, &c., as they are marked on the right-hand end of the beam. The letters on the lowest line are shown in the order they come between the divisions the whole length of the beam—they are drawn merely to show the types used.

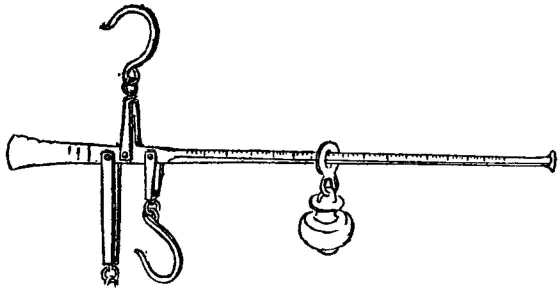


FIG. 46.—Old steelyard from North Italy. Bankfield Museum. Length, 22 cm.

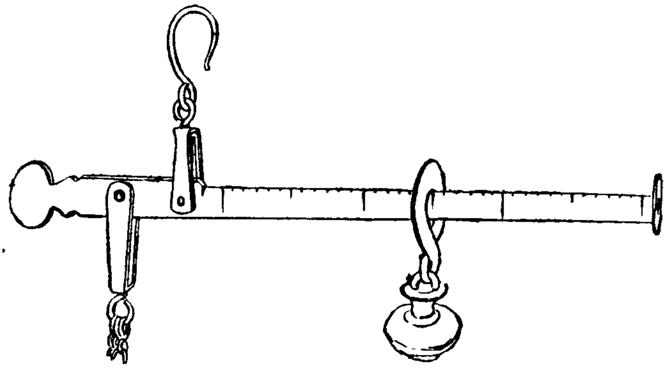


FIG. 47.—Old steelyard from North Italy. Bankfield Museum. Length, 28 cm.

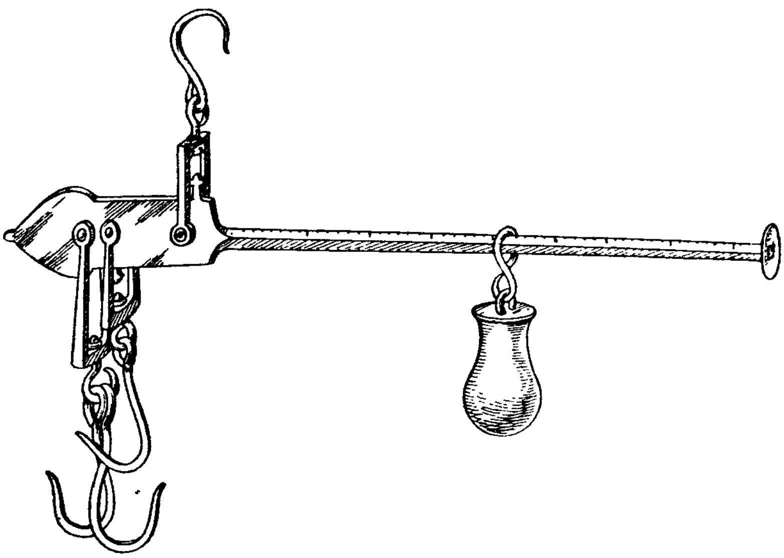


FIG. 48.—Old steelyard from North Italy. Bankfield Museum. Length, 37 cm.

In Figs. 46, 47, and 48 we have illustrations of three modern steelyards from North Italy, considerably the worse for wear, in which the fulcrum is placed so low that the tendency to upset is very marked. This class of balance is at the present day largely of English make. The manufacturers are careful to specify in their catalogues that it is not permissible to use such steelyards in England.

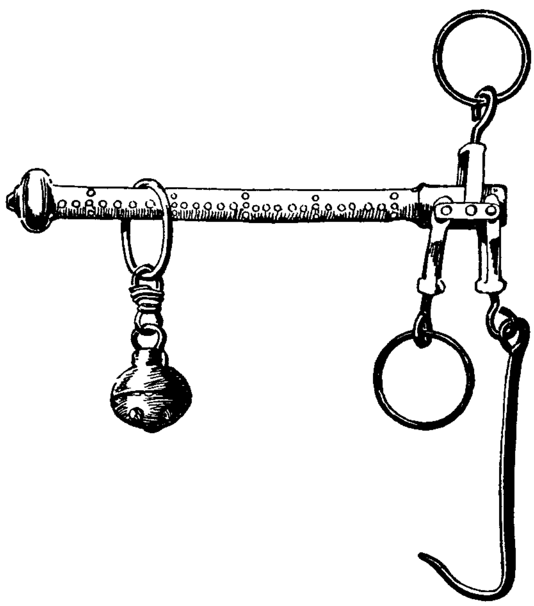


FIG. 49.—Eighteenth-century English steelyard. Horniman Museum. Wood beam 21 cm. long.

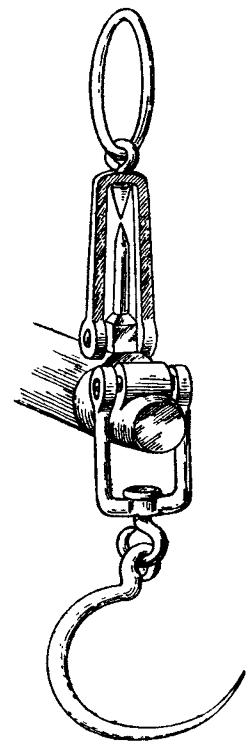


FIG. 50.—Details of Malay steelyard. Bankfield Museum.

A seventeenth-century English steelyard, Fig. 49, now in the Horniman Museum (illustrated by kind permission of Dr. Harrison), has the turnover arrangement similar to that of a Chinese-made steelyard from Perak, Fig. 50, in Bankfield Museum. In the engraved certificate which is supplied to successful students by the Pharmaceutical Society, the right-hand figure, facing the reader, appears to be holding a steelyard in its hand.

Although the bismar was largely used in England, I have not met any old paintings or prints illustrating one. In Holbein's Archangel Michael the angel is making use of an ordinary two-pan balance in which to weigh human beings, and in his portrait of George Gisse, merchant, of the Steelyard, London, in the Royal Museum, Berlin, an ordinary balance with two triangular pans is shown. So, too, while the steelyard may almost be said to have its home in the East, there are numerous references and illustrations showing the use there of the ordinary

two-pan balance. Archdeacon J. H. Gray gives a plate representing a Chinese moneychanger with the two-pan balance (*China*, London, 1878, ii, p. 83), and De la Loubère refers to weighing "much alloyed silver in one of the pans of a balance and the silver money in the other pan" (*Descrip. du Royaume de Siam*, Amsterdam, 1713, i, p. 221).

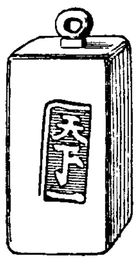


FIG. 51.

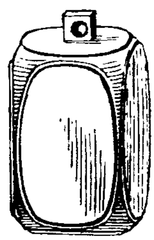


FIG. 52.

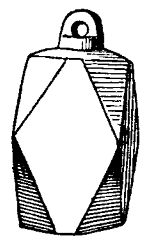


FIG. 53.

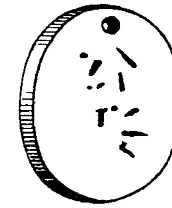


FIG. 54.

Figs. 51–54.—Poises of Chinese steelyards in British Museum.

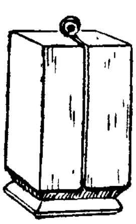


FIG. 55.

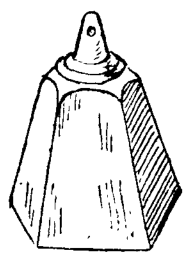


FIG. 56.

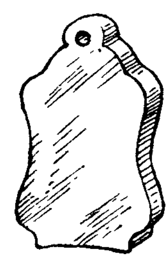


FIG. 57.

Figs. 55–57.—Poises of Chinese steelyards sketched at missionary exhibitions. Fig. 55 is a double-power poise.

As to the word "steelyard" the late Mr. Thomas Wright, in his work on *Uriconium*, p. 308, indicates that it is probably derived from the word *stelleere*, and quotes Cotgrove's French Dictionary. Professor Skeat, *Notes and Queries*, 4th series, 1903, p. 272, points out that neither the word *steel* nor *yard* has anything to do with the origin of the name steelyard. He thinks that it may be derived from the Latin *hastile*, the shaft of a spear. Since then there has been anothe explanation put forward in a little-known book entitled the *Strife of the Scales*, the author of which, the late Mr. J. A. Kingdon, was a Past Master of the Worshipful Company of Grocers.[1] The book deals with the legislation which was intended to abolish the Danish bismar and to give its place to the steelyard. In speaking of the old auncel (or bismar) he says that:

"In the year 1458 two women were reported to the Dean and Chapter of St. Paul's, each of them having in their possession *unum auncellum*, which laid them

[1] The first edition consisted of fifty-nine pages, and it appears only twenty copies were printed off; at the foot of the title-page are the words "Privately printed for J. A. Kingdon." The second edition, published by Rixon & Arnold, 29, Poultry, London, consisted of seventy-eight pages, and only 100 copies were printed.

Fig. 1.—Chinese steelyard with double-power poise. In the possession of Mr. E. C. S. George, C.I.E.
Fig. 2.—Chinese steelyard. Bankfield Museum. Length, 226 mm.
Fig. 3.—Japanese steelyard. Bankfield Museum.
Fig. 4.—Anamite salesman with steelyard. G. Knosp. *Globus*, vol. lxxx, Feb. 1st, 1902, p. 123.
Fig. 5.—Poise of steelyard Fig. 14. British Museum.

FIG. 4

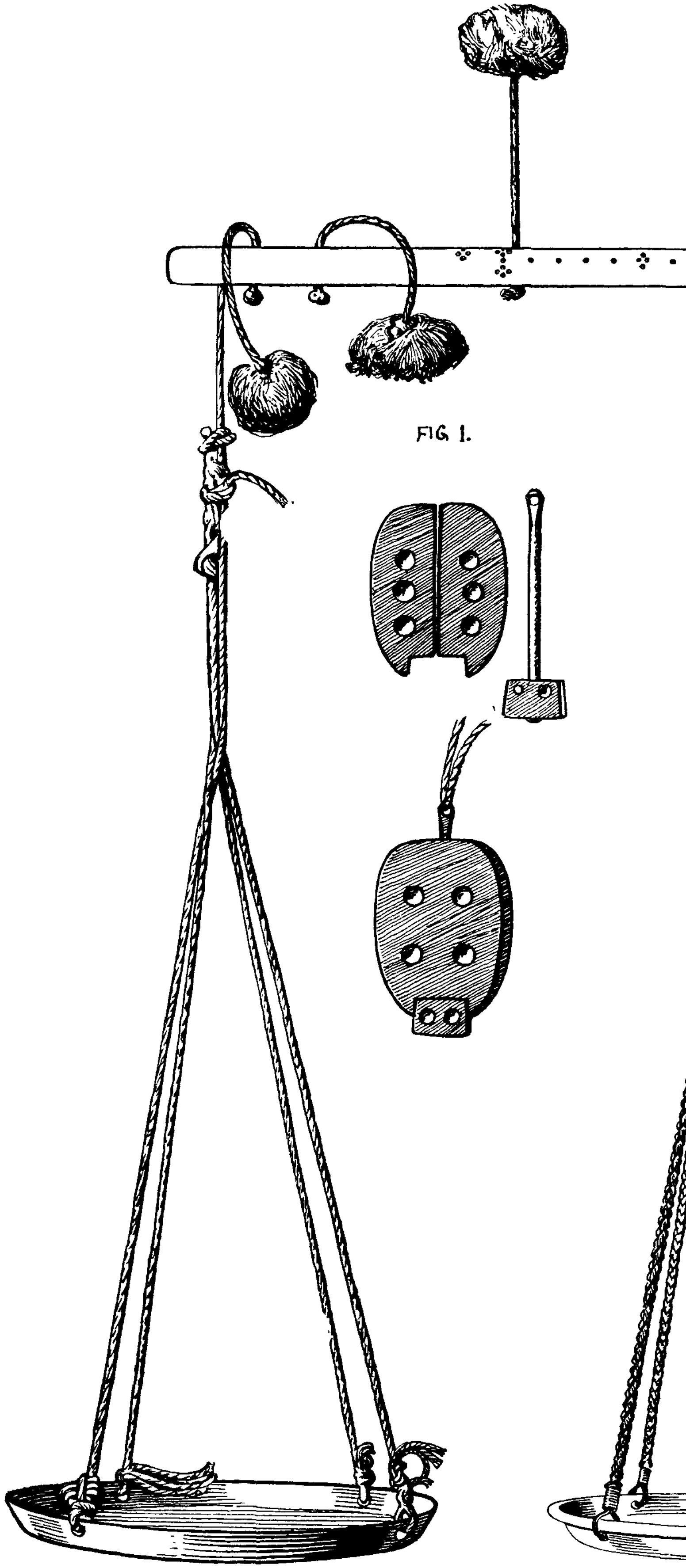


FIG. 1.

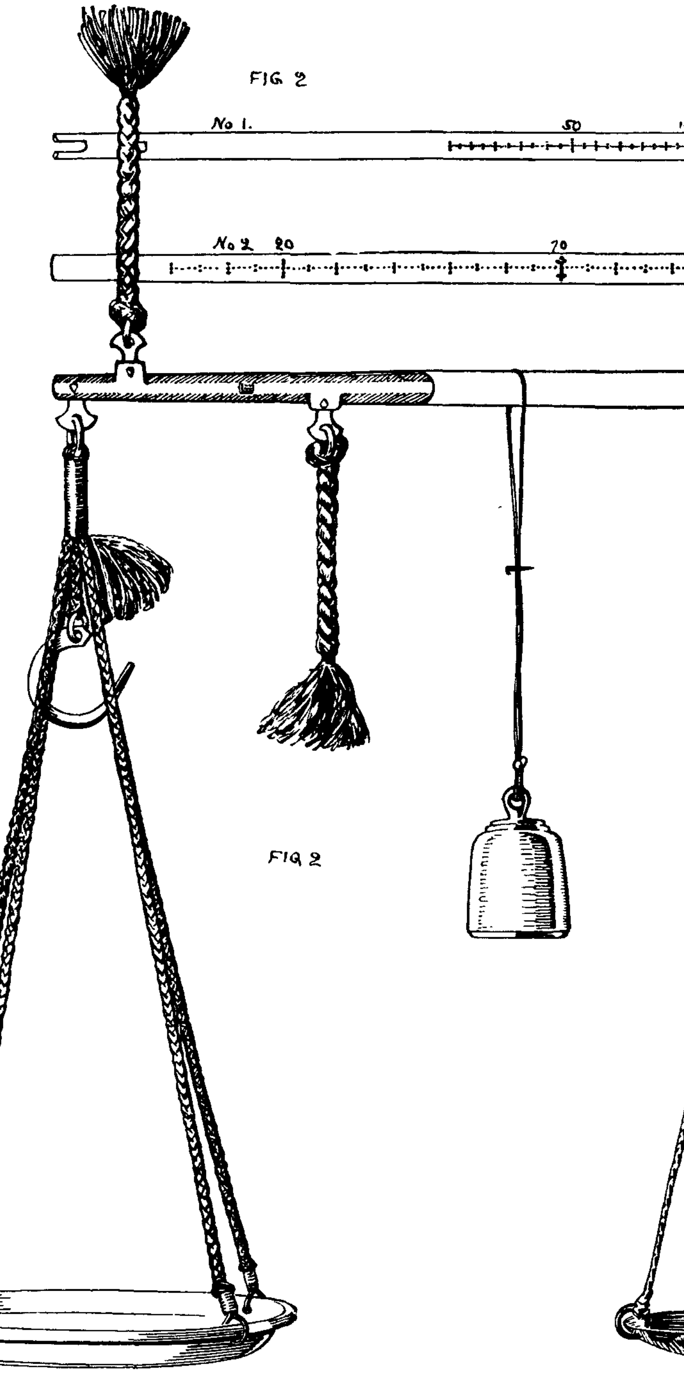


FIG 2

FIG 2

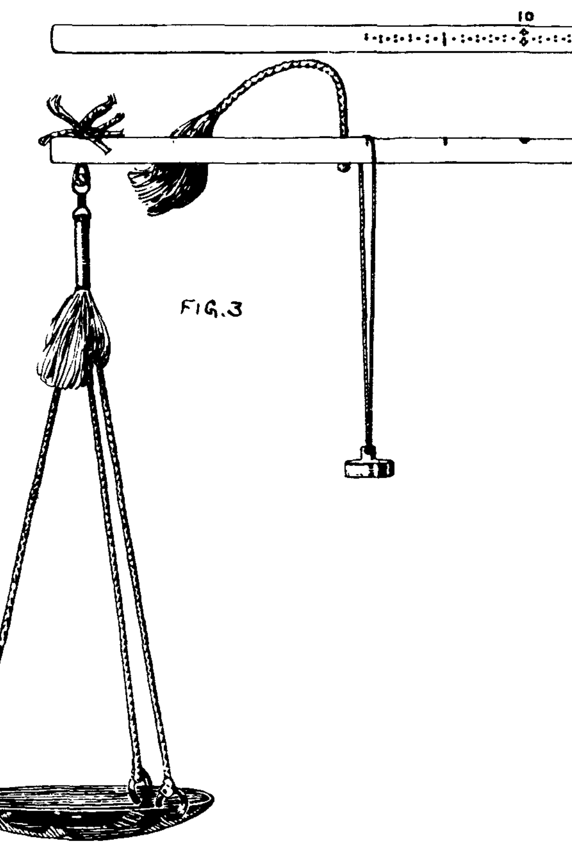
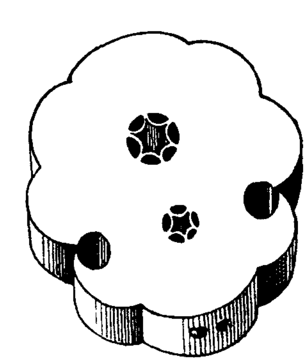


FIG. 3

FIG 5



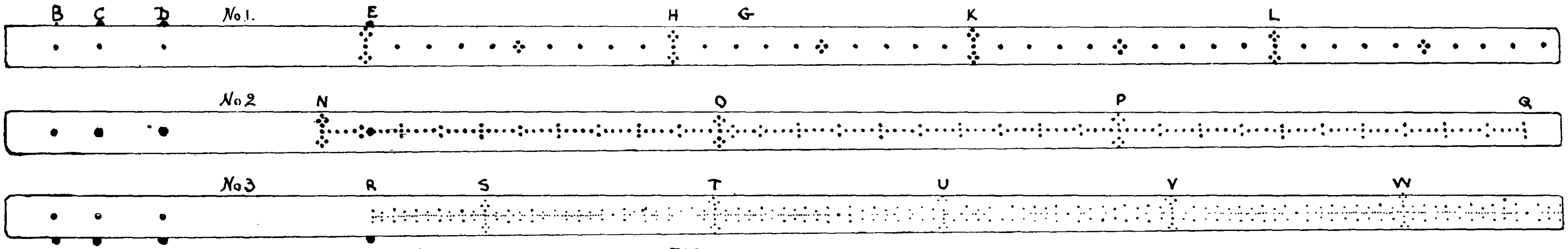


FIG.6

FIG. 6.—Beam and scales (full size) of steelyard Fig. 1, Pl. XXIII.

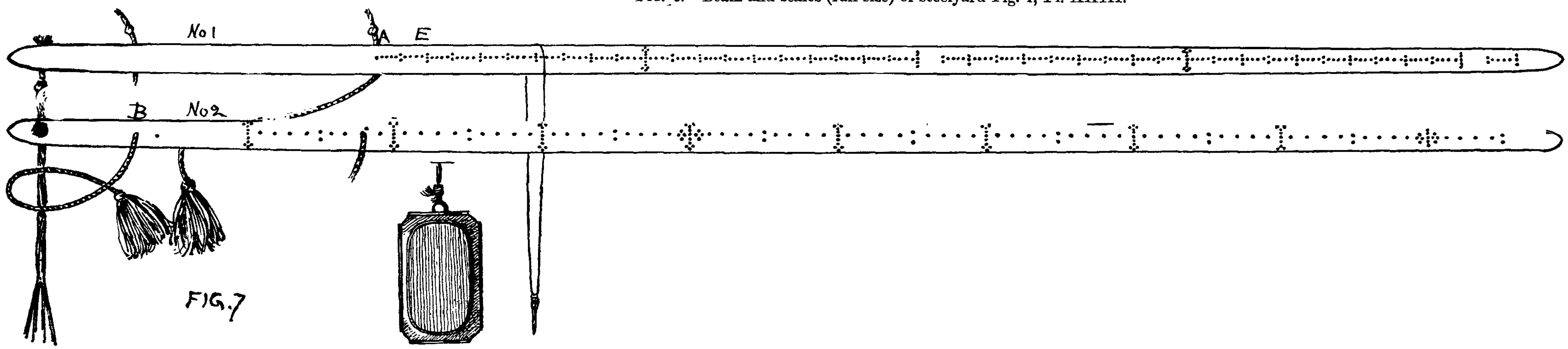


FIG. 7.—Chinese steelyard. Bankfield Museum.

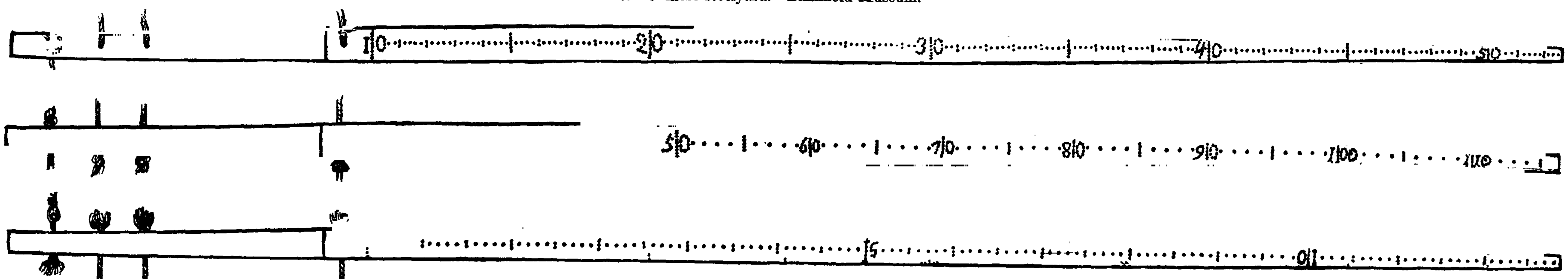


Fig 8

FIG. 8.—Beam and scales of a Chinese steelyard, with European cyphers; it has an old label on which is marked, "probably Italian." British Museum.

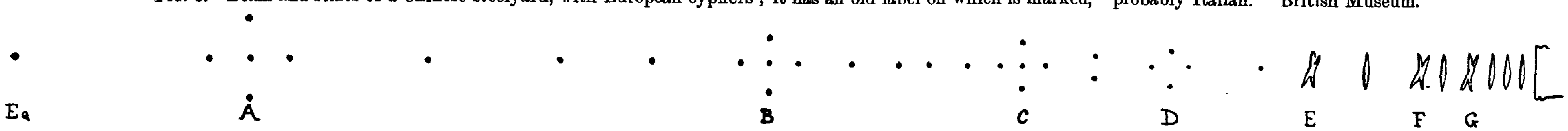


FIG. 33.—Scale on Malabar bismar, Fig. 32, p. 221.

open to ecclesiastical censure. What is to the present purpose is the wording of the Archbishop's denunciation, as it helps to determine what the *auncell* really was. The word is used in the document in connection with *scheft* or pounder, names of Danish instruments of the bismar order of construction; and this suggests that it was really a bismar, which, when Norman rule came in upon London trade, received a Norman name denoting its nature, a one-armed, single-scaled weighing-lever, *lanx, lance, lancella,* and in vernacular *auncel,* a meaning which the Saxon or Danish word would not convey to the new rulers. It was not a *stalier* or *stilliard,* although that also was a *lanx,* for the word *statera,* which needed no change by the Normans, stood for that; but it was different, and specially condemned by the statute by name. It was different, but in what particular feature different its new name did not explain. The word *statera* would be known to the Normans. It was Latin, and passing through the Italian *stadera* reached *stalier stilliard,* and in 1700 *steelyard* in English. This form of lever, as is well known, measured weights by means of a counterpoise movable along the beam or rod of the instrument. The bismar was otherwise used. In this the counterpoise was fixed and the fulcrum or swing-point was moved along the rod."

Table of Weights.

I. Chinese.

		1 Ti (Li, Nominal Cash)	=	0·0378	grammes.		
10 Ti	=	1 Hun (Sen, Canderen)	=	0·3781	„		
10 Hun	=	1 Chi (Chien, Mace)	=	3·7817	„		
10 Chi	=	1 Tahil (Tael, Liang)	=	37·8169	„	=	$1\frac{1}{3}$ oz. avoir.
16 Tahil	=	1 Kati (Catty, Chin)	=	604·791	„	=	$1\frac{1}{3}$ lb. „
100 Kati	=	1 Picul (Tan)	=	60·48	kilos.	=	$133\frac{1}{3}$ lb. „

II. Japanese.

		1 Shu	=	0·416	mommé	=	1·565 grammes.
6 Shu	=	1 Bu	=	2·5	„	=	9·391 „
4 Bu	=	1 Riyo	=	10	„	=	37·565 „
16 Riyo	=	1 Kin	=	160	„	=	601·040 „
1 Kwan			=	1,000	„	=	3·756 kilos.

THE METALS IN ANTIQUITY.

The Huxley Memorial Lecture for 1912.

By William Gowland, Assoc. R.S.M., F.R.S., F.S.A., Emeritus Professor of Metallurgy at the Royal School of Mines.

[With Plates XXV–XXIX.]

The only records available to us of man before he became acquainted with metals are written in the remains which have been unearthed from time to time in the caves or sites where he led a precarious existence, in the districts over which he wandered, in the mounds or places in which he was interred, or in the debris of terrestrial denudation, river gravels and the like. The same, too, is true of later man during the early metal ages. But as time rolls on and the ruder arts and usages gradually develop into a civilization approaching, and indeed in some respects equalling, or even excelling that of our own day, the evidence afforded by the remains is supplemented by those records of the past which we find in the clay tablets of Chaldaea and Assyria, the papyri and inscriptions of Egypt and the literature of ancient Greece and Rome.

As regards metals, however, the chief and often the only evidence on which reliance can be placed is that derived from the same source as in the pre-metal ages, viz., the objects and articles which excavations bring to light. It is too often assumed that before man became acquainted with metals he was a mere savage but little superior to the wild animals of his time, but that this view is entirely erroneous, certainly as regards late neolithic man, is incontestably proved by the evidence presented so clearly to us by the vestiges which have been laid bare of his culture and mode of life. He was a farmer, kept domestic animals, was acquainted with the arts of weaving, the manufacture of pottery, his dwellings were constructed with considerable skill, and at his death he was buried with ceremonial rites. Such were the men who were the discoverers of metals and the first metallurgists. They were, in fact, men possessing greater intelligence and a higher culture than is usually attributed to them, and if we ourselves were deprived of metals I hardly think that we could surpass them in the exigencies or even the arts of everyday life.

Hence it was that they were able to make full use of the new discovery of metals and at once to produce weapons and implements of bronze as well suited to their special needs as any we could make of that alloy at the present day.

Of many of their implements it has been truly said that "they are works of art, a rude and primitive art it must be confessed, but as full of meaning in its simple expression as the Venus of Melos or the friezes of the Parthenon."

As regards the order in which the metals were discovered, it is self evident that it cannot have been the same in every region, as metallic ores are very capriciously distributed in the world : in a given locality it frequently happens that one may be abundant and the others altogether absent. Further, the metals which occur native, *i.e.*, as metals in nature, viz., gold, copper, silver, and iron, with the exception of the first, are even more irregular in their occurrence than ores.

It is extremely probable, if not absolutely certain, that neolithic man would first become acquainted with the "native" metal gold, as it is of almost universal occurrence in the sands and gravels of rivers and in superficial alluvial deposits.

It is, however, one of the most worthless of metals for the practical purposes of life and especially for the simple requirements of Stone Age man. Moreover, in the small particles in which it usually occurred, for no pieces of even moderate size have come down to us from prehistoric times, it could not be applied to any use by early men, as they would be unacquainted with the art of melting, by which alone these particles could be converted into lumps; whilst if any lumps had been found, although capable of being fashioned by simple hammering into many forms, yet these, on account of the softness of the metal, could have had no useful applications except as personal ornaments.

Unlike gold, copper is found in the metallic state in very few localities but in greater abundance.

The chief of these are the Lake Superior district, Chili, Yunnan (China), Bolivia, Burra Burra (Australia), and Cornwall. In the first named, notably in the Lake Superior district, it occurs in large quantities, and the masses have been rudely worked there from very early times; it was, hence, the first metal to be known and used by the men of these regions.

Silver is of rare occurrence as metal in nature and is not found like gold in river sands and gravels, but in mineral veins or lodes, from which it can only be obtained by mining. Hence, the metal was unknown during the Early Metal Age.

Iron, in the condition of metal, occurs native in two forms, one of cosmic and the other of telluric origin. The former as meteorites (siderites) has a limited distribution, the greater number occurring in North and South America.

As regards the latter the only occurrence of masses of undoubted telluric origin are those found by Nordenskiold at Ovifak, in Greenland.

The Eskimo, as is well known, fashioned knives, etc., from the Ovifak masses and iron was hence the first metal known to them.

It is, however, manifest that the discovery of the native metals was quite insufficient to affect to any great extent and in any but limited areas the old Stone Age culture. No advance beyond that stage of culture could be made until the art of extracting metals from their ores and of melting and casting them had been discovered, by which implements and weapons could be fabricated, which would not only satisfy more perfectly the needs of the individual and tribe, but facilitate their expansion and create new ones.

In fact, until man had made that discovery, although in a few exceptional

localities he may have been acquainted with native metals, he still had not passed out of the Stone Age.

Why this discovery was so long delayed and the Age of Stone continued for such a vast period it is impossible for us to conjecture, especially so when we consider that the ores which would be within reach were the oxide ores occurring on the surface of the ground, which are the most easily reducible of all minerals.

When a lump of any of these ores, either of copper carbonate, tin-stone, or brown iron ore or hæmatite, which, by chance, had been one of the ring of stones surrounding the camp or domestic fire and had accidentally become embedded in its embers, it would undoubtedly be reduced to metal.

The cakes or lumps so produced would naturally attract the attention of primitive man, and if he attempted to fashion them as he was accustomed to do in making his implements of stone, he would then become acquainted with their curious properties of malleability and toughness, which were wanting in his customary materials, and so be led to apply them to practical use.

It was thus, in my opinion, that man first became really acquainted with metals. The camp fire was, in fact, the first metallurgical furnace, and from it, by successive modifications, the huge and complicated furnaces of our own days were gradually evolved.

The first stages in this evolution were easily reached, a cavity would be formed in the hearth of the fire for the reception of the molten or reduced metal and this would be made deeper and wider as time went on and larger quantities of metal were needed.

In Japan, when I arrived there in 1872, the evolution of the smelting furnace had only reached this stage. In fact, no appliance of the primitive metallurgy of the Bronze Age could have been either simpler in shape or ruder in construction than the furnace then in use and even still employed at many small mines.

It consists merely of a hole in the ground, yet by means of it, until a few years ago, all the copper, tin and lead produced in the country was obtained. Plate XXV, Fig. 2, represents the smelting of tin.[1]

At Laurion, in Greece, in the earliest times of metallurgical work in that metalliferous region, a further stage of development had been reached in the evolution of the smelting furnace.

The smelting cavity or hearth was raised above the ground and enclosed within a low wall of stone.

The first stage in the production of metal having been reached, there still remained to early man the most important problem of utilizing the lumps, which his camp fire had yielded. For their utilization in the case of iron, as we shall see later, nothing further was required than to remove them from the fire and hammer them on a large stone with a stone hammer, as is still done in several localities in Africa.

[1] *Archaeologia*, vol. lvi, p. 294. Reproduced by permission of the Society of Antiquaries.

In the case of copper and its alloys, however, remelting was necessary, and to effect this the primitive metallurgist of those remote times simply made a miniature copy in clay of the cavity in his camp fire, in the form, at first, of a shallow dish or saucer, embedded it in the hearth of the fire, piled the fuel above it, and so obtained a small quantity of molten metal. Further, just as he had deepened the cavity in the hearth so that it might contain more metal, in like manner he gradually increased the depth of his shallow dishes until they became veritable crucibles of cup-like forms, from which, in fact, the crucibles of the present day have been evolved.

During the early stage of the Metal Age, the ores from which copper, and sometimes its alloys with tin, nickel, antimony and arsenic, etc., were obtained were, as I have already pointed out, easily reducible surface ores, occurring in the beds of streams or on mountain sides.

Mining operations were of a decidedly later period, when considerable advance had been made in the use of metal, yet it is a curious fact that even then, hammers and mauls of stone and picks of deer horn were still employed as tools by the ancient miners in the Asturias, at Rio Tinto, the Atlas district, Mitterberg in Austria, Lake Superior district, Mexico, and Chili.

At first sight they would seem to be singularly inefficient tools for breaking out the ore from hard rock, but the men of that time had evidently observed that stones are splintered by fire, and had applied that knowledge to aid them in their mining operations. This is indisputably proved by the remains of charred wood and charcoal which have been found at the end of the burrows in North Wales, Cardiganshire and the Mitterberg in Upper Austria and other places. This method of mining by the aid of fire was conducted as shown in Plate XXV, Fig. 1.[1]

Billets and faggots of wood were piled up against the face of the ore in such a manner that when set on fire the flame should play against the mineral mass to be disintegrated, the result being that a considerable quantity of the ore was splintered off in flakes, and the remainder to a certain depth was so much shattered that it could easily be detached by almost any kind of tool.

We will now proceed to the consideration of the respective metals known and in use in antiquity, and here I may say that great as has been the advancement in metallurgy since prehistoric times, yet in many localities the rude and primitive methods still survive.

In Japan, as I have already pointed out, this was notably the case until recent years, where all the useful metals—copper, lead, tin, and iron—were extracted by processes and appliances differing but little from those in use during the infancy of metallurgy, when men had just emerged from the Age of Stone.

It is owing to these survivals that we are able to interpret the meagre relics of that remote period, also to throw light on the imperfect accounts of Strabo and Pliny and other classical writers of the metallurgic arts as practised in later days.

[1] *Archaeologia*, vol. lvi, p. 269. Reproduced by permission of the Society of Antiquaries.

Copper.

Copper is found native as metal in but few localities, the most notable being the Lake Superior district, where it occurs in large quantities, and has been in use from very early times. It was hence the first metal to be utilized for practical purposes by the men of these regions.

In the Lake Superior district it is found in masses, frequently of enormous size. That shown in Fig. 1[1] weighs 3 tons. It was taken from an ancient pit, 16½ feet deep, and exhibits the marks of stone hammers or axes. Another mass, measuring 10 feet by 3 feet by 2 feet, and weighing over 6 tons, was found along with numerous stone hammers. It had been pounded with these until every projecting part had been broken off.

FIG. 1.—MASS OF NATIVE COPPER. LAKE SUPERIOR.

Many axes, lance heads, and other objects of a remote age, all fashioned from the native copper by simple hammering, have been unearthed from time to time.

It is extremely curious that the men of this region never discovered the art of melting the metal and casting it in moulds, so that although acquainted with metal they still remained in the Stone Age of culture.

In other regions of the world where man had discovered the art of reducing metallic ores to metal, the copper ores were oxidized copper ores, sometimes associated either with ores of tin, antimony, arsenic, nickel, or silver, in small amounts, or with tin ores in considerable quantities. In the former case, copper would be obtained on melting them, and would contain one or more of the metals enumerated in greater or less proportions, varying with the composition of the ore. In the latter case bronze would be produced. Hence, in Hungary, where the copper ores are associated with antimony ores, the early implements contain

[1] *Jour. Royal Anthrop. Inst.*, vol. xxxvi, p. 12.

antimony up to 4½ per cent., an alloy resembling bronze in many of its physical properties. Similarly, implements in Ireland and Egypt, sometimes contain 2 to 4 per cent. of arsenic, and in Germany from 2 to 4 per cent. of nickel.

In England, where copper and tin ores are so commonly associated, as in Cornwall, the earliest implements are of bronze.

Owing to the non-discovery of tin, or copper ores containing it, in early times in Ireland and their absence in Cyprus, the implements of the Early Metal Age in these localities are of copper, and this at a time when Central Europe was in the Bronze Age.

The fact is that the first metal obtained by primitive man by smelting ores depended on their composition, and in the localities where tin did not occur it was a more or less impure copper. It does not, hence, follow that there was a true Copper Age in Europe, although in Ireland, from the abundance of copper implements which have been found there, there was evidently a stage of transition between the Age of Stone and the Age of Bronze, during which copper was in use.

That this stage overlapped to a very considerable extent the Age of Bronze in Central Europe is distinctly proved by the copper halberds with rivets, described by Coffey (*Proc. R.I.A.*, 1908, pp. 94 *et seq.*). These copper halberds and the use of rivets show a marvellous advance in the art of metal working; their forms are those usually—and, I think, correctly—attributed to the Later Bronze Age in Europe, and they cannot have been originally invented in Ireland. The bronze implements of Europe must hence have been copied in Ireland, and, no tin or stanniferous copper ores having then been found there, copper had to be employed.

In Africa, apart from Egypt, there are so far no evidences of an intermediate stage between the use of stone and that of iron, notwithstanding the abundant deposits of copper and tin ores.

In Britain, suitable ores for the production of bronze were at hand, hence bronze and not copper was the first metal to be employed.

One of the earliest implements, a small flat axe found by Greenwell, together with a flint knife, a long flint scraper and some flint chippings, in a barrow in Yorkshire, have been adduced by Dr. Much in "Die Küpferzeit in Europa," being misled by its form, as evidence of a Copper Age in Britain, but on analysis I found it to contain 10·68 per cent. of tin.

As I have already stated, the first metallurgical furnace was the camp fire, and as time went on it gradually developed into the simple "hole-in-the-ground" furnace, which still survives in Japan.

The process of smelting, too, in Japan is of the simplest nature, and it also is a survival from a very remote period.

It is, therefore, in the highest degree probable, if not absolutely certain, that the process of smelting followed by the men of the Bronze Age was identical with that not yet extinct in Japan. It may be remarked further that the evidence afforded by the shape, size, and structure of the lumps of copper which have been found in the founders' hoards of the Bronze Age entirely supports this view.

The furnace is simply a hemispherical cavity in the ground without enclosing walls of any kind.

It is worked with an artificial blast of air, but when shallow the wind alone would be sufficient to obtain the temperature necessary for the reduction of copper ores to metallic copper.

The lumps of copper from founders' hoards are always fragments of rudely disc-shaped cakes of about 8 inches to 10 inches in diameter, and 1½ inch in thickness, having the largely columnar fracture of copper when broken near its solidifying point.

They show that the furnace was simply a small shallow hole or hearth scooped in the ground, about 10 or 12 inches in diameter, and that the operation of smelting must have been conducted as follows:—

A small charcoal fire was first made in the hearth, and when this was burning freely a layer of ore was spread over it, and upon this a layer of charcoal, then alternate layers of ore and charcoal were added in sufficient quantity to yield a cake of copper. The fire was doubtless urged by the wind alone in the earliest times, but later by some kind of bellows.

When all the charge had melted, the unburnt charcoal and the slag were raked off. The metal was not laded out, but was allowed first to solidify, and at the moment of solidification was rapidly pulled out and the cake broken up at once on a large stone. In Korea, at the copper mine of Kapsan, this primitive method of removing the copper from the furnace still survived when I travelled through that country in 1884.

The alloys of copper and tin during the Early Metal Age, and even somewhat later, were obtained not by melting together copper and metallic tin but by the reduction of oxidized copper ores containing tin-stone, or of copper ores to which tin-stone was added.

As the statement made some time ago by several Continental metallurgists has been recently repeated, that when a copper ore containing tin ore is smelted the tin does not unite with the copper but passes into the slag, I may be permitted to give here a brief account of the experiments I have already described before the Institute which completely disprove it.

"A furnace of the simplest form, merely a hole in the ground, was constructed in my laboratory at the Royal School of Mines. The fuel used was charcoal. A mixture of copper ore (green carbonate) and tin-stone was smelted in it, and a copper-tin alloy, a bronze containing 22·0 per cent. of tin, was obtained.

"A description of the working of one charge will suffice. The charge consisted of the following materials:—

Copper ore (copper carbonate) containing 30 per cent. copper	15 lbs.
Tin ore (cassiterite) containing 20 per cent. tin ...	10 „
Limestone	7½ „
Charcoal	10 „

"The charcoal and limestone were coarsely ground and mixed with the ores.

"The furnace cavity was filled with charcoal, which was also piled above it to a height of about 2 or 3 inches. When the charcoal was well alight a layer of the charge was spread over its surface, then another layer of charcoal, then alternate layers of the charge and of charcoal were added so as to form a conical heap. A gentle blast was then started through a 1-inch blast pipe, and when the charge began to sink down into the furnace cavity it was slightly increased. When the whole of the charge and fuel had sunk down into the furnace the blast was stopped, the slag and remaining fuel removed, and the metal allowed to solidify. The metal was analysed and found to contain 22·0 per cent. of tin."

The experiment was repeated several times, and in every case copper-tin alloys were obtained. These experiments prove indisputably that when a copper ore containing tin ore was smelted by primitive man, a bronze consisting of copper and tin was obtained, and affords a complete refutation of the statements that such ores will only yield copper and not a copper-tin alloy. It shows, further, that these statements are not based on any experimental work, but have been erroneously deduced from the methods of smelting in use at the present time, which differ *in toto* from those which were practised, and in fact alone possible, in the earliest days of metallurgy.

We will now proceed to the consideration of the alloys, accidental and intentional, which were employed in prehistoric times. Here again I may be permitted to repeat what I have already stated before the Institute regarding poor tin bronzes, as the old erroneous views are still occasionally set forth.

"We will first consider the alloys which were the accidental result of smelting impure ores. In this category may be placed all those which contain less than about 1–2 per cent. of tin, although in exceptional cases a much larger percentage of tin may be accidental, as, for example, when the metal was obtained by smelting a copper ore rich in tin ore.

"Now, the presence of as little as 1–2 per cent. of *tin* has a marked effect on copper, especially on copper of the nature of that produced in primitive furnaces. In the first place, it confers a certain amount of hardness, not very great, but decidedly perceptible, which can be greatly intensified by hammering. Secondly, it facilitates the production of sound castings with copper even when impure, which otherwise would be vesicular and useless.

"Hence certain copper ores, viz., those containing even small quantities of tin, would be used in preference to others for the extraction of metal for the manufacture of implements.

"The small proportion of tin present in some implements has been supposed by several archaeologists to be due to the oxidation or volatilization of the metal in a richer alloy by remelting, as in recasting worn or broken articles. Loss by oxidation or volatilization, however, is entirely governed by the conditions under which the remelting takes place, and there can be no fixed rule regarding it. Its amount depends, in the first case, on the extent to which the surface of the metal has been

exposed to the air during melting and when molten; and in the second case, on the temperature to which the alloy has been raised.

"In the rude furnaces of prehistoric times, when the metal was melted in clay vessels over which the fuel, charcoal, was piled, its surface would be but little exposed to the air; moreover, the temperature of the fire would not be excessive, so that there would not be much loss of tin in remelting, and the low percentages present in poor tin bronzes are not caused by this operation."

It has been frequently stated that the alloy used by the men of the Bronze Age generally consists of copper and tin in the proportions of 9 to 1. I have hence compared the analyses, which have been published, with the following results:—

Early Weapons and Implements—57 Analyses.

In 25 the tin ranges from about 8 to 11 per cent.
" 6 " " " " 11 " 13 "
" 26 " " " " 3 " 8 "

Later. Palstaves and Socketed Axes—15 Analyses.

In 13 the tin ranges from about 4·3 to 13·1 per cent.
" 2 " was about 18·3 per cent.

Spear and Lance Heads.

In 5 the tin ranges from about 11·3 to 15·7 per cent.

Still later. Swords—23 Analyses.

In 14 the tin ranges from about 8 to 11 per cent.
" 12 " " " " 12 " 18 "
" 7 " is less than 9 per cent.

It is obvious, therefore, that these statements do not accurately represent the facts. And if we consider the different uses to which the implements or weapons were put, it is evident that no single alloy could be equally suitable for all. For certain uses an implement of copper, or of an alloy containing but little tin, would be efficient. On the other hand, for a sword or dagger certain physical properties are essential that are not needed for an axe; thus, whilst 10 per cent. of tin, or somewhat less, would be satisfactory for the latter, a higher percentage, say from 11 to 14, would be required for the former. It is worthy of note that these proportions appear to have been frequently attained, and for this the men of the Later Bronze Age are deserving of great credit as metallurgists and workers in metal.

The methods and appliances adopted by prehistoric man for the manufacture of his copper and bronze implements are of not less importance and interest than those he employed in the extraction of the metal from ores.

The relics of his work which have been unearthed from time to time afford clear and ample evidence of his methods of manipulation and the nature of his appliances. The metal obtained by his smelting operations, as we have already

seen, was not laded from the furnace whilst molten, but removed when it was in the act of solidifying.

It had hence to be melted either alone or, as the Bronze Age advanced, with the addition of tin ore or even metallic tin. This remelting was effected in rude dishes or crucibles, Plate XXVI,[1] made of clay, mixed sometimes with fragments of quartz to render them more refractory, but often only with finely cut hay or straw. None was able to withstand a very high temperature; the fire was hence not placed below and around them as is the practice at present, but above and inside as follows:—

They were embedded in the ashes at the bottom of the furnace, which was merely a shallow depression in the ground, in such a manner that their bases and sides were protected from the intense heat of the fuel, their interior and upper edges only being exposed.

In consequence of this mode of heating the lower parts show but little traces of the action of a high temperature, whilst the upper edges and interior exhibit a fused or semi-fused structure.

The fuel used was wood and the charcoal produced during the process.

A temperature sufficiently high for melting the metal was obtained by the wind alone.

When the contents of the crucible had melted they were poured into moulds of stone, clay, or bronze.

In casting swords and daggers of bronze the moulds must have been of clay, and been heated to dull redness at the time when the metal was poured in—a method of casting which is still practised in Japan—as by no other means could such perfect casting of their thin blades have been obtained. The castings generally were hammered at the cutting edges, and it is to this hammering, and to it only, that the hardness of the cutting edges of both copper and bronze weapons is due, and not to any method of tempering. Much has been written about the so-called art of tempering bronze, supposed to have been practised by the men of the Bronze Age in the manufacture of their weapons; the hardness is also said to be greater than can be given to bronze at the present day. I should like to correct this error, as it can only have arisen owing to its authors never having made any comparative practical tests of the hardness of bronze. Had they done so, they would have found that the ordinary bronze of to-day can be made as hard as any, in fact harder than most, of prehistoric times, by simple hammering alone.

The sources whence copper was derived in early times are widely distributed as the ores occur in greater or less amounts in every country in Europe and in many districts in Asia.

In Europe an important site of very early smelting is situated on the Mitterberg Alp in the Austrian Tyrol, where rude mining excavations and heaps

[1] *Jour. Royal Anthrop. Inst.*, vol., xxxvi, Pl. III.

of slag are associated with stone implements and with pottery closely allied to that found in the pile dwellings of the Mondsee.

At Monte Catini and Capanne Vechie in Tuscany, numerous shafts and narrow levels bear witness to the extent to which the rich upper parts of the veins of copper ore were worked by the Etruscans and probably earlier.

An ancient mine also occurs at Agordo in the extreme north of Italy near the borders of Tyrol.

In Cyprus mining debris and vast mounds of ancient slags are found in many localities. This is not surprising if we remember that Cyprian copper was not only famed in the time of Homer but was sent as tribute to Egypt several centuries earlier.

Greece had but few and unimportant deposits of copper ores, and remains of primitive workings occur only in Euboea and Macedonia.

Spain, on the other hand, more especially the southern coast, was rich in ores, which yielded copper at the very beginning of the Metal Age in that country.

In the present state of archaeological enquiry and mining explorations it would be presumptuous to assign to any locality the earliest production of copper from its ores, yet there is strong evidence in favour of the view that it was most probably in Cyprus, and, somewhat later, in the south-east of Spain, the Mitterberg in the Austrian Tyrol, the Tuscan region in Italy, and Britain, that the metal was first obtained in Europe.

In Asia, the extraction of copper from its ores, as we shall see later, dates from a period more remote than in Europe.

Considerable deposits of copper ore extend on the south of the Euxine from Sinope to Trebizonde, and are now being worked at several places on or near the sites of very ancient mines.

Similar deposits also occur in the island of Kalki near the western entrance of the Bosphorus, and at Sarigari on its north-eastern shores.

To the south of the Trebizonde region, and near Erzerum in Armenia, and also at Diarbekr in the upper basin of the Tigris, vast accumulations of mining and metallurgical refuse, and numerous excavations mark the sites of an important copper industry of a very remote date. Of considerable importance too were the mines of the Sinaitic peninsula, which were worked for copper in the time of Seneferu (about 3733 B.C.) and probably very much earlier. The remains there consist of huge heaps of waste material from the mines and slags from the smelting works. I may say that samples of the ore sent to England a few years ago consisted of poor copper carbonates, the deposits having been exhausted of the richer ore by the old miners.

In India, in the Singhbhum district of Bengal and in the Madras Presidency, copper mining and smelting has been carried on from a very early period, and the number and extent of the ancient workings testify to the assiduity with which every trace of ore was followed up by the ancient miners. In Jaipur, too, are several very old mines consisting of tortuous galleries of great extent.

Copper ores are also found in several other districts but the above are the chief sites of prehistoric mining.

The materials for solving the problem, which is ever present with us, namely, the fixing of a relative chronology for the first use of copper by the various races or peoples of antiquity, are of a very fragmentary and too often of a decidedly nebulous character.

I may, however, be permitted to state briefly the present state of our knowledge on this important subject, and the conclusions which I think may not unreasonably be based on it.

Montelius[1] has proposed 2500 B.C. or a more remote period for the first part of the Bronze Age in Britain when copper was in use. This distinguished archaeologist[2] has also proposed 2100 B.C. for the small copper daggers in Northern Italy.

The copper of Cyprus, according to the inscriptions in the tomb of Thotmes III. (about 1500 B.C.), was received as tribute in Egypt in the form of vases and other vessels. They are of elegant design and workmanship and some are almost certainly of bronze. This undoubtedly indicates an advance in the metallurgic arts and skill in the working of metals that can only have been acquired after many centuries of practice. Hence, for this reason, 2500 B.C. cannot be considered as too early a date for the use of copper in Cyprus.

But further, if we examine the finds of bronze weapons made by Sir Arthur Evans at Knossos, to which the date about 2500 B.C. has been ascribed, and the copper for the manufacture of which was in all probability obtained from Cyprus, we are compelled, I think, to assign a not later date than about 3000 B.C. to the beginning of copper working in the island.

A very remote antiquity has been established for copper in Egypt by the discovery by M. de Morgan of copper articles in a tomb supposed to be that of Menes, which, if the supposition is a correct one, must be assigned to about 4400 B.C. And indeed there is no reason why copper objects of that early date should not have been in use by the ancient Egyptians, as we have already seen, the mines in the Sinaitic peninsula were being worked during the time of Seneferu (about 3733 B.C.). But long before actual mining operations were carried on, how long it is impossible to say, the metal must have been obtained by primitive methods from the surface ores. It is hence not unreasonable to assume that at least as early as about 5000 B.C. the metal copper was known and in use in Egypt.

Passing now to Chaldaea we are on less certain ground, yet the early inhabitants of Chaldaea were not unfavourably situated for obtaining copper, as the deposits of the Tiyari district, and even those on the upper basin of the Tigris, must have been accessible to them, and a few objects of the metal have indeed been found which can be referred to as early a period as those of Egypt.

[1] *Archaeologia*, vol. lxi, p. 162. Reproduced by permission of the Society of Antiquaries.
[2] *Jour. Anthrop. Inst.*, vol. xxvi, p. 258 (Table).

The earliest of these to which a date can be assigned are,—a small copper figure bearing the name of King Gudea (about 2500 B.C.); and some figures from Tell Loh (Shirpurla) which served to support votive tablets associated with bricks said to bear the name of King Ur-Nina (about 4500 B.C.). The latter figures, as specimens of metal working, are much in advance of the Egyptian objects of similar approximate date. It would therefore seem that an earlier date than 5000 B.C. should be assigned to the first use of copper in the Chaldaean region.

In the Troad, copper was in use also in very remote times, owing to the proximity of the ore deposits near the Bosphorus and the not far distant and easily accessible mineral region on the southern shores of the Euxine. Amongst the objects of the metal found by Schliemann in the lowest stratum of the First Prehistoric City (3000 to 2500 B.C. Dörpfeld) at Hissarlik were four knives, two with rivet holes, and one gilt. Now it is important to note that the manufacture of these knives indicates a degree of metallurgical knowledge and technical skill, possessed by the artificers of that time, that could only have been attained long after the metal was first known. It would hence seem that copper must have been in use there not later than in Cyprus.

In China, archaeological exploration has been of a very limited character, as the examination of ancient burial sites is not only prohibited by the Government but is strongly opposed by the people. Hence we know practically nothing from actual finds of the Early Bronze Age culture of that ancient people. Copper ores occur in many places, but it is impossible to assign an even approximate date to the earliest workings, as they have not yet been systematically examined. If, however, we accept the date 2205 B.C. given in Chinese annals for the casting of the nine bronze tripod cauldrons, often mentioned in historical records, then the metal copper may have been in use as early as 3000 B.C. or even earlier.

From the foregoing brief statements of the dates relating to the Metal Age in prehistoric times it will be evident that very much still remains to be made out, and much more exploratory work must be done, respecting the intricate subject we have been considering,—the relative chronology of the discovery and application of copper—before we can say with certainty in what part of the world man first passed from the Stone into the Metal Age. It is not impossible that copper or an accidental alloy of the metal may have been obtained contemporaneously in different places.

It would, however, seem, on a review of the data available at present, that it is in a high degree probable that the ancient peoples of Chaldaea and Egypt were acquainted with copper at an earlier period than the races of Europe.

Tin.

It may be of interest here to quote the curious teachings of ancient Chinese philosophers as to the origin of the metal tin. "Tin," say they, "is produced by the influence of the feminine principle in nature, being classed between silver and lead. The metal arsenic generates itself in two hundred years and after another

two hundred years is converted into tin. Tin being a product of the feminine principle has tender qualities. When it is submitted to the influence of the masculine principle it is converted into silver. It is sometimes found that wine kept in tin vessels has a poisonous action on man, which proves that the arsenic had not been completely transformed into tin."

The metal tin, although of little practical use alone, was a most important metal to the men of the Early Metal Age by reason of the valuable properties it confers upon copper when alloyed with it to form the alloy bronze.

Notwithstanding its easy fusibility a high temperature is required for the reduction of its ore, yet, like copper, if, by chance, a lump of tin-stone became embedded in the fuel of the camp fire metallic tin would result.

In Cornwall the conditions for the production of the metal were especially favourable; the ore was undoubtedly abundant and subterranean mining operations were not required, as it was found either at the surface of the ground or at but little depth below it, disseminated through the old river gravels.

From the fusibility of tin and the comparative ease with which the ore is reduced, the metal must have been produced in Cornwall not very long after neolithic man settled there. And that this settlement took place in a very remote age is sufficiently proved by the megalithic monuments which are so numerous in that part of Britain. Further, the assumption that the earliest smelting can be traced to a Phoenician or any other foreign source is absolutely unsupported by any evidence.

It is, however, very surprising that no objects of tin have been found in association with either these early remains, or in the long barrows of a subsequent period, in the not far distant counties of Wilts and Dorset, or under any other conditions in undoubted association with the stone implements of the transition period.

The earliest mention of tin by a classical writer is found in Homer, where it is said to have been applied to the ornamentation of the shield of Achilles.

It is also mentioned in other passages of the *Iliad*, as in the description of the shield of Agamemnon and the chariot of Diomede.

The earliest finds, however, are of the Later Bronze Age. The metal does not lend itself to the manufacture of weapons or industrial tools. On the other hand, it is admirably adapted for simple ornaments, such as beads, rings, armlets, and the like, and was frequently so employed by the peoples of the pile dwellings in the lakes of Switzerland, France and North Italy and the early inhabitants of Persia.

Other minor uses were the ornamentation of pottery with strips of the metal and later the tinning of articles of copper and bronze.

Bronze flat axes in Scotland were occasionally tinned.

It is just possible that although the metal may have been long known in Cornwall, it may not have been regularly smelted from its ores until a knowledge of its value as a constituent of bronze or as an object of barter had

been ascertained by intercourse with the Mediterranean peoples through the medium of the tribes inhabiting the north-west and north of France.

As regards the making of bronze in the earliest part of the Bronze Age, there is no evidence to show that this was effected by the melting together of the metals copper and tin. Neither, as it has been demonstrated already, is metallic tin necessary, as when tin ore is melted with copper and charcoal, excellent bronze is obtained. Further, no metallic tin has been found in any of the founders' hoards which have been unearthed, except some roughly melted lumps of the metal, associated with two socketed celts, a broken palstave, a piece of bronze and a quantity of well-smelted copper at Kenidjack (W. Cornwall).[1]

It is true no tin ore has been found in the hoards, but this is not surprising as the ore is usually an earthy looking, pale brown material which would certainly be disregarded by the discoverers of the hoards unless they had specially looked for it.

No cakes of tin representing the earliest smelting of the ore have survived in Cornwall, but shallow holes in the ground containing charcoal and ashes, sometimes intermingled with fragments of the metal, have been discovered from time to time near ancient workings in the old river gravels. These are the remains of the furnaces of a very early, if not perhaps the earliest period. Unfortunately, neither sketches nor measurements appear to have been made of them by their explorers, and the descriptions which have been recorded are imperfect and wanting in exactness.

The furnaces seem, however, to have generally been merely narrow shallow trenches in the ground. The smelting operation was one of the simplest kind, and must have been conducted in the following manner:—

The trench, having been first lined with clay, was filled with brushwood, above which small logs of wood were piled. A light was applied, and as soon as the logs were burning fiercely and the trench was full of glowing embers, small quantities of ore were then thrown upon the top of the fire from time to time. More wood and ore were added, until the required amount of tin had accumulated in the trench. The fire was then raked away, and the tin laded out into a hole in the ground or into a clay mould near the furnace. Probably sometimes it was allowed to flow as it was reduced into a cavity at one end of the trench. The object of the trench, in addition to its use as a receptacle for the metal, was to hold a sufficient quantity of embers to reduce the portions of ore which had not been acted on in the upper part of the fire.

But the intercourse of the Britons with the traders from the more advanced races of the Mediterranean doubtless soon led to further modifications and improvements in their furnaces and mode of smelting.

The shallow hole then become deeper so as to "confine the fire," and was excavated near the edge of a bank of earth. The blast was no longer admitted over the edge of the cavity but through an opening just above the base, the molten tin being allowed to flow out, as it was reduced, through a still lower hole.

[1] *Archaeologia,* vol. xlix, p. 181. Reproduced by permission of the Society of Antiquaries.

The ruins of a furnace of this kind were found at Trereife near some very extensive ancient excavations for tin ore.

From the construction of the furnace, and from the occurrence of Roman pottery and other remains in the debris of others resembling it, I think there can be but little doubt that the furnaces in use during the period of the Roman occupation of Britain were of this form, although they had their origin in earlier times.

It is, however, very doubtful whether they were actually worked by the Romans themselves, as their sites are almost invariably found away from the coast, and there is an absence of sufficient evidence to show that the interior of Cornwall was ever completely subject to Roman rule. And the fact that there are no great military roads west of Exeter tends to indicate that the Britons there were at least

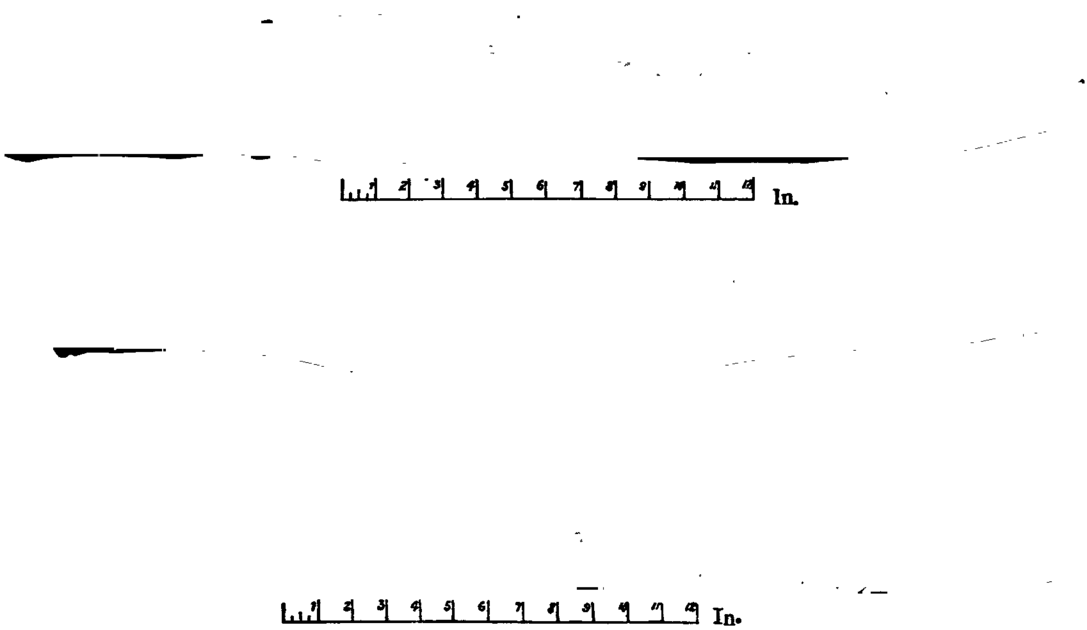


FIG. 2.—ANCIENT BLOCK OF TIN.

semi-independent, although they undoubtedly carried on a friendly intercourse for the purpose of trade with the Roman settlements on the east and on the coast.

One of the most interesting of the few blocks of tin which have been found is the well-known ingot, Fig. 2,[1] which was dredged up at St. Mawes near the entrance of Falmouth Harbour. It has two projecting arms at each end and measures 2 feet 7 inches in length over all. Its weight is about 158 lbs.

Some ingenious conjectures as to the object of casting tin in this form are contained in the pamphlet by Sir Henry James, mentioned in the footnote.[2] He suggests that this shape was chosen in order to facilitate transport. Thus the

[1] *Archaeologia*, vol. lvi, p. 300. Reproduced by permission of the Society of Antiquaries.

[2] Note on the block of tin dredged up in Falmouth Harbour, by Col. Sir Henry James, R.E., Director of the Ordnance Survey, London, 1863.

curved base allowed such blocks to lie thwartwise in the bottom of a boat, whilst the double arms enabled them to be slung by ropes on each side of a pack horse.

Among the chief localities which afforded tin from the earliest times and for many succeeding centuries, Cornwall occupies an important position. From thence the metal found its way by barter from tribe to tribe to Central and Southern Europe. It has been and is still held by some that the Phoenicians not only sailed to this tin-bearing district of Britain, but actually established colonies there. For neither of these theories, for theories they only are, is there the slightest foundation in fact. If the Phoenicians were the distributors of tin from Britain in the Mediterranean region, the tin had first reached the South of Gaul overland and was only then accessible to them. Even in Roman times it was never sea-borne to the Mediterranean, except for the crossing of the Channel, but followed the old trade route, along with pigs of British lead, one of which has been found at St. Valery-sur-Somme, and another at Chalons-sur-Saône.

In addition to Cornwall, the north-west of Spain (the provinces of Orense and Pontevedra) was also an important tin-bearing district, and it was from these two regions that the ancient world derived their chief supplies of tin. Subsidiary to these were the districts of Salamanca, Cartagena, and Almeria in Spain and the provinces of Beira, Minho and Tras-os-montes in Portugal.

In Italy, near Campaglia Marittima, not far from the Tuscan coast, there are extensive excavations made by the Etruscans for the extraction of tin-stone, which occurred there in irregular pockets and fissures.

Another mine on the east of the Monte Fumacchio was also worked by them.

Tin ores also occur on a minor scale in several other parts of Europe and doubtless afforded the men of the Bronze Age small quantities of the metal.

Of these localities I may first mention Brittany, where the tin veins of Cornwall are fully represented, and there are remains of ancient workings at Pyriæ near the mouth of the Loire, and at Villeder (Dept. Morbihan).

In the Erzgebirge there are also deposits of tin-stone, that appear to have been worked only in comparatively recent times, but as the ore occurs on the crests of the mountains, not only in veins but as surface deposits, it is not unreasonable to suppose that it was a source of tin in a much earlier age.

In Ireland tin ore undoubtedly occurs in the gravels of the streams in Wicklow, and has been found, but only in very small quantities, in washing the alluvium for gold. It is hence just possible that during the Later Bronze Age the locality may have been a source of tin.

Passing out of Europe to Asia we have in the Malay Peninsula and the adjoining islands of Banka and Billeton the most abundant occurrence of tin-stone in the world.

So far distant is it, however, from Europe and the lands of the great nations of antiquity that it is rather difficult to say whether or not that region was a source of tin in remote times. If it was, the tin may have found its way through India, but of this we have, at present, no conclusive evidence.

In Persia we are on safer ground, in Khorasan Van Baer has discovered very ancient mines of tin ore, the metal from which could easily have been transported to Mesopotamia, Egypt, the Troad, and the Mediterranean.

In China, in Yunnan, tin-stone occurs in abundance in the old river gravels not far from deposits of copper ores and native copper and has been worked from the earliest times. The metal appears to have been known and used by the Chinese as a constituent of bronze from a very remote antiquity, probably as early as 3000 B.C.

At the beginning of the Hsia dynasty (2205 B.C.) it is recorded that the Emperor Yu cast the famous nine bronze tripod cauldrons from metal sent up from the nine provinces, which were preserved as palladia of the empire until about the third century B.C.

In Nigeria very extensive deposits of extremely pure tin-stone occur in the river sands or gravels, the district, however, is a remote one and was hence probably not accessible to the Mediterranean people.

Gold.

As I have already pointed out, gold, on account of its very wide distribution in the sands and gravels of rivers, its colour and brilliant lustre, must have been the first metal to attract and be known to prehistoric man in most regions of the world.

But its usual occurrence in grains or flakes, but rarely in small or large lumps as nuggets, must have prevented its use generally even for ornaments until the art of melting had been invented, and this can hardly have happened until man had passed beyond the Stone Age culture and entered the Bronze Age.

Yet in this connection it must be remembered that even in later times gold was not cast directly in the form of the object it was desired to make but merely in small masses or bars, which were subsequently fashioned by simple hammering.

So that the working of gold when found in lumps is perfectly compatible with the simple arts of the Stone Age and could have preceded the Age of Bronze.

Yet there has not been found, to my knowledge, any object of gold with undoubted Stone Age remains.

As is well known, gold from alluvial deposits, and these were undoubtedly the first deposits to be worked, contains more or less silver. If much is present the metal is very pale in colour; it was then termed *asem* by the Egyptians and *electrum* by the Greeks.

The art of separating the silver from it was not known in the earliest times. Agatharchides, however (about 113 B.C.), in his description of the Nubian mines mentions salt, lead, and bran as having been added to the gold before melting. These additions would certainly have the effect of removing the silver and purifying the gold, but only if followed by cupellation, which must have been practised for the removal of the lead, although he does not mention this.

From a knowledge of these facts, Berthelot inferred that from the presence or absence of silver the approximate age of an object of gold could be determined: the oldest specimens would contain silver, whilst more modern ones would not. With the object of testing this view he made the following analyses:—

Gold.	Silver.	Organic matter.		
92·3	3·2	4·5	Gold leaf from mummies of VIth Dynasty ...	Berthelot.
92·2	3·9	3·9	" " " " " " ...	"
90·5	4·5	0·5	" " " " XIIth " ...	"
99·8	—	—	" " " " Persian Era ...	"

When, however, we consider that alluvial gold sometimes contains only small amounts of silver such, in fact, as might remain in gold treated by the old rude methods of refining, it is open to doubt whether his inference is applicable in all or even in any cases.

The specimen of the Persian era (527 to about 420 B.C.) in the above table is exceptionally pure and had most probably been treated for the separation of silver by the sodium chloride process which was then known.

It may, however, have been vein gold, as subterranean mining must then have been practised, and such gold has been found to contain 99·8, 99·9 per cent. of gold.

Under the term "electrum" are included various pale yellow alloys of gold and silver, natural and artificial.

It is often stated that the native alloy of gold and silver contains from 75 to 80 per cent. of gold, but this is pure theory, based solely on the statement of classical writers, Pliny and Isidorus, as it must have been much more variable in composition.

In a series of determinations of the specific gravity of electrum coins, a method which, however, only gives very approximate results, Barclay and Head found that in electrum coins varying in colour from rich yellow to yellow, the specific gravity indicated a range of from 36 to 72 per cent. gold, and in others only pale yellow and a very pale yellow, 10 to 43 per cent.

Now the colour of gold is rapidly lowered by only small amounts of silver; with from 20 to 40 per cent. of silver the colour changes by tints of greenish yellow to white; whilst with 50 per cent. silver the colour is absolutely white.

Hence the coins containing 50 per cent. and less of gold consisted of a perfectly white alloy, and any yellow colour they had was due to artificial colouring, probably similar to that practised by the Japanese, who, by treating gold and silver alloys with the juice of unripe plums, dissolve out the silver from the surface, leaving a layer of yellow gold.

It is also almost certain that the alloys containing less than 60 per cent. of gold were artificially prepared, as no native gold of lower fineness has been found in any part of the world.

Electrum was apparently much prized, as it is mentioned so frequently along with gold. Yet the reason for this is not obvious; it may, however, have been

because the alloy is capable of receiving a more brilliant polish than silver, and is not liable to tarnish, or because when treated with an appropriate reagent, as the vinegar obtained from plum juice, the rich yellow colour produced was preferred to that of ordinary gold. Hence probably its use by the goldsmith for ornamental objects. In the coins of electrum, in which the proportion of silver is nearly always high and sometimes largely exceeds the gold, the alloy is undoubtedly artificial, the silver having been added to economize gold. A perfectly parallel case is found in Japan where the gold coins of certain issues contain only from 30 to 60 per cent. of gold; but from the colour resulting from the above treatment cannot be distinguished from those containing a higher percentage of the metal.

For a knowledge of the earliest mining and metallurgy of gold we naturally turn to Egypt and its confines, a region renowned as early as 1500 B.C. as a land in which "gold is as common as dust."

Whilst according to the stele of Sa Hathor, who lived during the reign of Amenemhat II. (2400 B.C.), the washing of the alluvial deposits in the Sudan was then a flourishing industry.

In this connection it is noteworthy that we owe to Egypt the first mining map in the world. It represents a mining district of the time of Seti I. (about 1350 B.C.), or Rameses II. (about 1330 B.C.), the locus of which has not yet been determined. It is depicted on a papyrus in the collection in Turin, which has been described by Chabas. A reduced copy is shown in Fig. 3.[1]

I and II.—Two parallel valleys, one of which is apparently strewn with blocks of stone.

The inscriptions on the papyrus describe some of the details of the map as follows:—

III.—Road to the sea—

A. Mountains where the gold is washed. (Another reading is "Mountains from which the gold is brought.")

B. Gold-bearing mountains.

H. Houses for the storage of the gold.

S. A stele of Seti I.

The large building on the side of the upper valley is a temple of Ammon and at T is a pond or tank.

The ancient mines are scattered over Upper Egypt, Nubia, and the Sudan. This gold-bearing region and the remains left by the old miners have been explored and examined during recent years by the engineers of the mining companies, which have been formed for exploiting and reopening the old mines.

The remains make perfectly clear to us the entire procedure of the ancient gold miners, from the breaking down of the gold-bearing rock to the production of bars of the precious metal.

[1] Reproduced from *Geschichte der Bergbau- und Hütten-technik*, Fr. Fricae, p. 11, by permission of Herr Julius Springer.

To what even approximate date the earliest of these remains should be referred is for the present a matter of conjecture, but the exquisitely wrought gold bracelet found by Petrie on the arm of the queen of King Zer, successor of Menes, takes us back to about 6,000 years ago, whilst a small ingot of gold found by Quibell in a prehistoric grave at El-Kab demands an even more remote date.

The ancient workings extend from lat. 27°, *i.e.*, north of Keneh, to lat. 18°, a little south of Suakin, and on the west to the Nile, a vast area of about 250,000 square miles.

It has been thought that this district in early times was extraordinarily rich in gold, from the almost fabulous amounts of the metal said to have been produced in it. It may possibly have been so, but in this connection it must not be forgotten

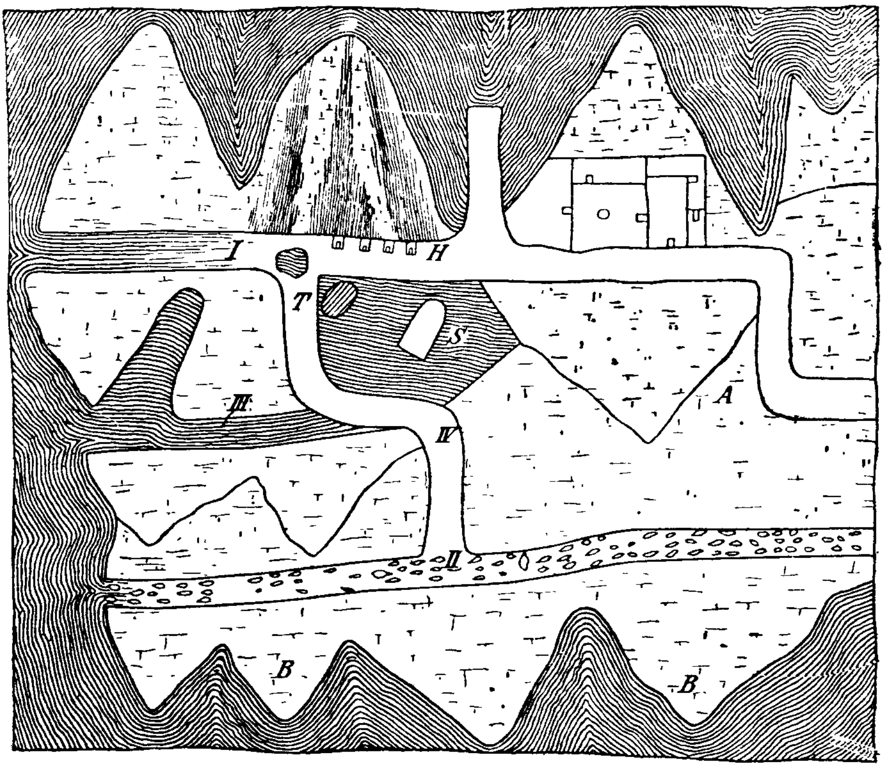


FIG. 3.—ANCIENT EGYPTIAN MAP OF GOLD MINE.

that skilful native gold washers in Yezo and elsewhere often recover gold with only a simple dish from sands which are too poor for treatment with our modern appliances. Further the "tailings," *i.e.*, the residue from which the gold has been extracted, which occur in large quantities at Um Gariart and elsewhere, are reported as containing only traces of gold. This tends to show how skilful were the old miners, and that if a sufficient amount of forced labour was available, vast quantities of gold may have been obtained from ores comparatively poor or of only ordinary richness.

Before proceeding to consider the appliances and methods of the old miners, as illustrated by the remains they have left to us, it may be well to state the

principle on which the simplest operations for the extraction of gold from sands and rocks at all times, even our own, depend. It is as follows:—When material bearing free gold, as sand, or rock which has been reduced to fine particles by grinding, is washed with water either in shallow dishes or on a sloping surface, the particles of sand or rock being lighter than the gold are washed away and the gold remains behind and can be collected.

The ancient mines consist of shallow pits in detritus, shallow trenches along the line of a vein, and subterranean workings, the first being probably the oldest. In the last mentioned, a number of shafts, sometimes 160 feet in depth, have been found sunk along the vein, where it appears at the surface, and connected by tunnels. Both trenches and shafts are often in very hard rocks, the mining of which had been facilitated by the action of fire as previously described.

The appliances used in the treatment of the ore after leaving the mines have been found in large numbers. They consist of stone hammers or mauls, roughly cuboidal and worn on every side.

Rubbing mills, consisting of a flat boulder or thick slab of the hardest rock with mullers of the same material from 5 to 15 lbs. in weight, Fig. 4.

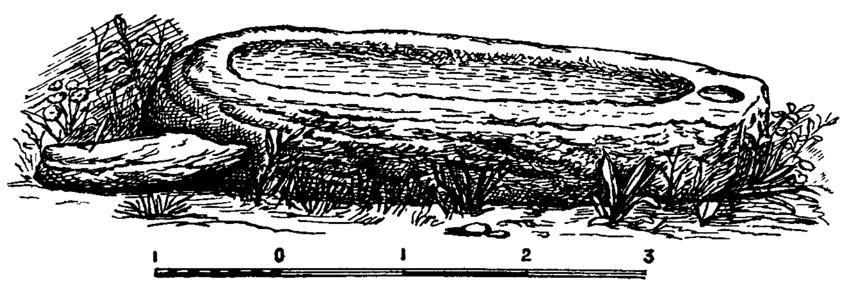


FIG. 4.—RUBBING MILL FOR GOLD ORE. FROM ANCIENT MINE, NUBIA.

Grinding mills or querns, from 18 to 20 inches in diameter, the nether stone being of very hard rock. The upper stone is generally of a softer rock, a coarse-grained granite, weighing originally about 50 or 60 lbs., Plate XXVII, Fig. 2.

Stone inclined tables, on which the particles of rock were washed away from the gold.

Broad flat dishes. The broken remains of these are common. They were used in the final washings.

Broken crucibles for melting the gold.

From the above-mentioned remains it is clear that the following procedure was carried out for the extraction of the gold.

The lumps of ore from the mines, after the rejection of the non-auriferous pieces, were broken up coarsely by the stone mauls either on a hard stone or on the rock *in situ*, the latter being in many places worn into holes by the operations.

The coarse ore was then taken to the rubbing mills, where it was reduced to finer particles, but not sufficiently fine for washing. It was therefore further

ground to a finer state of division in the querns, into which it was fed through a hole in the upper stone; after which it was ready for the tables.

The fine material was placed on the smooth inclined surface of the table and washed gently with water in such a manner that the light particles of stone flowed over the bottom of the table, whilst the gold remained upon it. Usually this gold would not be sufficiently freed from rocky or mineral matter for melting, this was then removed by a further washing in the shallow earthen dishes. The gold was now melted in crucibles and cast into ingots. From the quantities of slag found, fluxes of some kind must have been used with the intention of purifying the gold. Unfortunately, no analyses of the slags have yet been made, so that it is impossible to say what the fluxes were. The melting was, however, very carefully carried out, as no trace of gold can be detected in the slags by panning. Such were the appliances and processes of the prehistoric and protohistoric miners of this auriferous region.

From the above account it will be seen that the evidence afforded by the remains confirms in a very remarkable degree the description of the work of the mines given by Agatharchides.

In Japan, until quite recent times, the ancient method of grinding gold ores in querns before washing still survived, Plate XXVIII, Fig. 2.[1] In fact, the process in vogue was closely similar to that of the old Sudan miners, except that the coarse ore was first reduced to small size by iron pounders. The fine mud from the quern was washed with the addition of water on inclined tables, on which sheets of cotton cloth were spread. The particles of gold were caught on the rough surface of the cloth, and the earthy material was carried away by the water. The cloths were washed from time to time in cisterns of water when the gold and some earthy matter settled to the bottom and were finally completely separated by further washing in shallow dishes.

The ancient process for separating silver from gold by means of common salt I also found in use in Japan in 1872. The operations as conducted there throw considerable light on the mode of procedure followed at the early Egyptian mines, a somewhat confused description of which is given by Agatharchides. The gold from the final washing was mixed with common salt (sodium chloride) and clay, and piled up in the form of a cone in a broad shallow crucible. The whole was then introduced into a furnace containing charcoal as fuel and kept at a red heat for 12 hours, by which means any silver contained in the gold was converted into chloride. The dish with its contents was then removed, washed with hot brine and water, the silver chloride was dissolved and the gold left in a purified state.

We will now consider the chief sources of gold which were available to the peoples of antiquity.

In Europe itself there were few auriferous deposits, except in Macedonia, Thrace, Spain, Gaul, Dacia, Dalmatia, and Ireland.

In Macedonia, extensive remains of ancient workings are found near the source

[1] *Archaeologia*, vol. lvi, p. 272. Reproduced by permission of the Society of Antiquaries.

of the Gallico, a small river rising in a group of mountains to the north of Salonica. Within these mountains recent explorations have shown that every stream shows the presence of gold, and signs of ancient alluvial mining are very numerous.

The gravels are still washed in a desultory way after floods.

Tradition assigns the mines of Philip of Macedon to this region.

In Thrace, in the basins of the Strymon and the Maritza (the ancient Hebros), and in the Rhodope mountains, are considerable remains of ancient gold washings, and a little gold is still obtained in these districts, but to what extent they were productive in early times it is impossible to speak with certainty.

The evidence afforded by the remains would, however, tend to show that Greece was never very rich in gold.

In Spain, Phoenicians, Carthagenians, and after them, the Romans, found an almost inexhaustible richness in the noble as well as in the common metals. In widely-separated districts enormous heaps of waste and astounding underground workings testify to the magnitude of the mining operations, more especially those of Roman times.

Asturias, Galicia, the basin of the Sil, the north-western portion of the province of Leon, and the upper waters of the Ebro were the chief seats of Roman gold mining. Both alluvial deposits and quartz veins were worked. The skill and indomitable energy exhibited in the execution of this work is well shown by the remains left at the mine of Las Medulas on the boundary line of the provinces of Leon and Orense. Here, for the mere purpose of bringing water to the mines for washing the ore, there are seven ditches arranged one above the other, cut in the slate, each ditch being 26 miles long and 4 to 5 feet wide. The same men who planned these works turned the course of the River Sil at a point lower down, in order to wash the sands and gravel of its bed for gold. This was done by cutting through a promontory of solid rock a tunnel wide enough for the egress of the waters, and high enough for a sailing boat with main sail up to pass through it.

Other mines were worked in the south near Cordova, the Sierra Nevada, and other places, and in Portugal on the Tagus and Douro.

In Gaul, according to Diodorus, gold was so plentiful that both men and women were adorned with massive gold ornaments, but the objects which have been unearthed lend no support to this statement. Remains of ancient gold mines, however, occur on the northern slopes of the Pyrenees in the Cevennes and, recently, some remarkable excavations have been found in Limousin and Creuse and near Montrevault (Maine-et-Loire).

In Bohemia, an important ancient gold mine, said to have been worked in pre-Roman and Roman times is situated at Eule, 10 miles south of Prague, in the vicinity of, if not quite on, one of the main trade routes for amber from the Baltic to the Adriatic.

By "trade" routes, I do not mean that amber was actually carried by the men who found it on the shores of the Baltic to the Mediterranean, but that they were the routes along which it passed by inter-tribal barter.

In Transylvania (Dacia), in the Cris (Körös) valley, an ancient gold industry was already flourishing in the time of Trajan, and some of the mines are even now worked near Vöröspatek and also at Zalatna.

In Bosnia (Dalmatia) there are also considerable remains of Roman gold mining.

Of the Urals there are no records by classical writers, but gold mining on a more extensive scale than elsewhere in Europe has been carried on from early times, and the mines there doubtless furnished the metal for the gold objects which have been dug up in the south of Russia.

Ireland.—In no country in Europe has a greater number or greater variety of gold objects been found than in Ireland.

The source of the gold has been variously ascribed to India, Gaul, Africa, and other countries. But gold occurs in six or seven localities in Ireland, notably in Wicklow. Hence there is no good reason for supposing that the gold of the objects was obtained from anywhere except the country itself.

In 1795, and for some years subsequently, the gravels of Wicklow, especially those of the streams from the granite mountain Croghan Kinchella, were worked by the Government and private people and yielded considerable amounts of gold.

Pieces of gold, according to Kinahan, have been dug up from time to time in the valley of the Dodder, and a nugget weighing 21½ ounces was found in a stream flowing from the mountains mentioned above.

It is just possible, therefore, that the earliest gold ornaments of Ireland were made by the simple hammering of nuggets without melting and some may perhaps belong to the Stone Age.

In Britain, small nuggets have been found in Cornwall, but there have been no systematic workings there; in Wales, however, at Dolaucothy, near Pumpsant, Carmarthenshire, there are extraordinarily vast remains of Roman mining. The auriferous veins extend chiefly across a width of 80 feet and have been mined both by open and underground workings. The waste heaps from the crushing of the gold-bearing rock are estimated to contain 500,000 tons of material, the mine must therefore have yielded a large amount of gold.

The regions of Asia, noted by the poets, historians, and geographers of antiquity, have been but little explored by geologists or miners, so that we are only imperfectly acquainted with the extent and nature of their ancient workings. The sands of the Pactolus, formerly proverbial for their richness, still yield gold to infrequent and indigent washers, and the streams of ancient Colchis have not ceased to bring down the precious metal from the regions of Armenia and the Caucasus, yet only in irregular and scanty amounts.

But it was not from these regions only that Asia supplied the ancient world with gold. In the upper basin of the Amu Daria, and its tributaries, in the Bokhara district, and in the lower slopes and streams of the Altai Mountains, extensive heaps of the mining refuse testify to the large quantities of the metal which must have been procured there by the miners of early times.

China is not rich in gold and the auriferous sands of the rivers of Korea were not worked at a very early period.

Further north, however, in the Manchurian region and Siberia, the basins of the Amur, Sungari, Tumen and Lena Rivers have yielded in the past and are now yielding very large amounts of gold, but, unfortunately, there is no evidence to show to what extent, if at all, they were exploited in prehistoric or protohistoric times.

India, at all times, has been regarded as a land of gold, yet the gold-bearing districts are almost exclusively confined to comparatively small areas in the south, so that the question naturally suggests itself, whether the gold was chiefly obtained by mining or by external intercourse.

Gold certainly occurs in small quantities in the sands and gravels of many rivers and streams, but the chief remains of ancient workings are found in the Wynaad district of Malabar and Nilgiri, and in Mysore and Haiderabad. In the former the country is covered with detritus left by the ancient miners, who here were not content to treat only the alluvial deposits but sank shafts in the quartz veins, yet none of the large number of mining companies with modern equipment has been able to extract the gold of this field with profit.

In Mysore, where the goldfield has become an important one, very extensive ancient workings occur, in some of which the shafts extend to a depth of 300 feet.

In the state of Jashpur (Central India) there are tracts of alluvium in the valleys honeycombed with shallow pits of the old gold miners, but the deposits are extremely poor. The streams of the Punjaub contain but little gold.

As regards Persia, its golden mountains can only be regarded as poetic fictions.

On a review of the above facts as regards the gold production of Asia, it would seem to be in the highest degree probable, if not absolutely certain, that the chief localities in this continent from which the nations of antiquity derived their gold were Lydia, Colchis, Bokhara, and the Altai region.

The last-named region may be thought to be too remote, but we must remember that the jade found by Schliemann in the first, second, third, and fifth cities must have been brought from the equally distant Kuenlun Mountains, the only locality in which this stone is found.

We have now considered the chief localities of the ancient world in which gold-bearing gravels or rocks have been worked in early times, the interesting question now arises—from whence did each of the various peoples and nations of antiquity obtain their gold ?

In relation to this it is almost unnecessary to point out that for the acquirement of valuable objects or materials, distance does not appear to have been an insuperable obstacle even in very remote times, thus in Europe we find amber following regular trade routes from the Baltic to the Mediterranean before the dawn of history, and in Asia, as we have already seen, jade finding its way from the Kuenlun Mountains to Hissarlik.

As regards the source whence the ancient Egyptians derived their gold, the answer presents no difficulties, as the rich auriferous regions of Upper Egypt were

at their very doors, and both records and remains testify to the vastness of their mining operations, and the vigour with which they were carried on.

On the opposite shores of the Red Sea the land of Midian has been claimed as an important source of gold to the ancient world, and especially to the Egyptians, the country, however, has not been examined by mining experts, it is hence impossible to say whether or not there is any foundation for such a claim.

Assyria and Chaldaea, so far as archaeological investigations have gone, have yielded but little gold either as funeral ornaments or domestic or ceremonial vessels or appliances; on the other hand, their records speak of extraordinarily vast, almost fabulous, amounts received as tribute or obtained as the spoils of conquest. And indeed, these, although much exaggerated, must have been to a great extent the principal source of the metal. There are no auriferous deposits in Mesopotamia, and it has been supposed that Babylon obtained much gold from India, but there is no satisfactory evidence to show that that country was an exporter of gold.

That it was imported from Egypt during the XVIIIth dynasty we have the testimony of the Tell-el-Amarna tablet No. 8, in which Tushratta, writing to Amenophis III. (about 1450 B.C.), says: "Send me so much gold that it cannot be measured, more gold than thou didst send to my father; for in my brother's land (*i.e.*, Egypt) gold is as common as dust."

The Minoans, if we may so call the people of the ancient empire of Knossos, for whose beginning we have to go back as far as 4000 B.C., next call for our attention. As has been shown by the brilliant discoveries of Sir Arthur Evans they were a trading people whose empire rested on sea-power, so that for the gold they needed we are not limited to one region only.

One of the chief sources must have been the rich Nubian mines, the gold from which would reach them through Egypt, or more probably through Libya, where there were one or more Minoan settlements, and with which country there was an established intercommunication.

The auriferous region of Mount Tmolus in Lydia, and possibly the gold-bearing gravels of Macedonia and Thrace, may also have contributed to their wealth in gold.

The Mycenaeans, who were also possessed of much gold and were, too, a seafaring people, doubtless obtained the metal from the same sources as the Minoans.

A wider range in auriferous localities was possible to the later peoples of Greece. Colchis and the Amu Daria region, certainly, and probably the remoter parts of Asia—the districts of Yakutsk and the Amur—contributed to their wealth in gold. But not inconsiderable quantities must have been obtained from Egypt, Gaul and Spain, and from even their own mines in Siphnos, Macedonia, and Thrace, whilst the spoils of conquest in Asia afforded an amount of the precious metals which it is impossible for us to estimate.

The Romans after establishing their supremacy in both the west and the east

were in possession of all the auriferous districts of Europe and Western Asia and possibly of those of Upper Egypt and Nubia.

The richest mines were those of Galicia and North-west Leon (Spain), Vöröspatek, Transylvania, Bohemia, and Bosnia, in all cases mines which had already been worked by the inhabitants of these districts.

I have already described the magnitude of the Roman works at Las Medulas (Spain) and Dolaucothy (Wales), but in other parts of Spain and at Vöröspatek (Alburnus Major), Transylvania, the mining operations were conducted on a not less magnificent scale.

At the latter place Mr. Horace Sandars, who visited it in 1903, states that a trachyte mountain has been literally hollowed out from the top, and in most places by the aid of fire.

I am also indebted to him for the illustration of the bas-relief found near Palazuelos, representing Roman miners in Spain. Plate XXIX.

His description of it is as follows: "The bas-relief represents a gang of stalwart men going leisurely to their work. The foreman, being a person of much importance, is a big man. He carries in his right hand a pair of large double-looped tongs, while his left hand is passed through the ring of some hollow object, which may be a bell. The miner who precedes him carries, in a somewhat unnatural position, a pick, or rather an implement which served either as a hammer or a pick. The miner in front of him again carries a lamp. Whether the other two in the front row carried anything or not it is impossible to say. The men are represented as moving along, and that they are walking through a gallery is, I think, shown by the striations in front of the foremost man. Each man has the middle part of the body protected, apparently, by short drawers, while over them there is what appears to be a leather band or belt, probably a very useful protection against friction and bruising by the baskets in which they carried the rock and ore to different parts of the mine. The appearance of the eyes is due to the long exposure of the stone to the elements."[1]

Silver.

The metal silver is, like gold, found in the native state, *i.e.*, as pure metal, but in that form it has only a very limited distribution and usually occurs in but very small quantities.

Alluvial deposits, or the sands and gravels of rivers, do not contain it, and it has to be sought for in mountain regions, where it is embedded in mineral veins. It differs, too, from gold when it occurs in the native state in being almost invariably in the form of delicate filaments or thin foil, and very rarely in lumps or nuggets, so that, without being first melted, it could not be made into even the simplest objects. Hence, it has played no part in the culture of early man, and, indeed, it has never been found in association with any of his remains until long

[1] *Archaeologia*, vol. lix, p. 321. Reproduced by permission of the Society of Antiquaries.

subsequent to the time when he had become acquainted both with gold and copper.

The ores from which the metal was first obtained were undoubtedly either ordinary lead ores, in which it is invariably present, or silver ores containing considerable amounts of lead.

In the absence of lead, the silver could not be extracted by any process until comparatively recent times; and although there is evidence that the Romans were acquainted with true silver ores, yet in order to obtain the silver they contained they were compelled to mix them with lead ores before smelting.

The first and essential process then for the extraction of silver was the process of smelting ores for lead, the product being always the latter metal containing the former dissolved in it in greater or less proportions.

Therefore it follows that the metal lead must have been known to man at least a short time before he became acquainted with silver.

The chief ore of lead, galena, which always contains silver, is of very common occurrence, and in many localities is found in vast, almost inexhaustible, deposits, which, as the remains of ancient excavations show, once cropped out at the surface of the ground.

The ore, too, is of brilliant metallic appearance and of high specific gravity, characters which cannot have failed to excite the curiosity of primitive man. Its great brittleness, however, would render it worthless to him for any practical use, but if, as the late Dr. Percy[1] has remarked, "he were to throw it on his blazing wood fire, even he could hardly fail to observe the remarkable change it might thereby undergo. The hard brittle ore might in a greater or less degree be transformed, as though by magic, into soft malleable lead." I think there can be no doubt that the discovery of the metal arose in this way and that the first silver-lead smelting furnace was the domestic fire.

The discovery of the metal silver by early man must have very closely followed, if indeed it was not simultaneous with, the discovery of lead, for, if by chance a piece of lead was left in the camp fire for some time, the lead would be entirely dissipated owing to oxidation and volatilization and a small piece of silver would be left.

Of course the discovery of the metal in the native state may perhaps have come first, but on account of its form, as we have seen, it could not be utilized, hence it is only with the discovery of lead that the history of silver really begins.

The methods by which lead and silver were obtained in early times from argentiferous lead ores or silver ores mixed with lead ores, and these were the only available sources of silver, will now be briefly considered. For the elucidation of these methods and the appliances employed we are aided not only by a study of those in use in Japan, which have survived there from prehistoric times, but also

[1] *The Metallurgy of Lead*, by Dr. Percy, p. 213.

by the actual remains which have been unearthed at Laurion in Greece, in Spain,[1] and at Silchester in our own country.

With these data as a basis we are led irresistibly to the conclusion that the earliest furnace was simply a shallow circular cavity in the ground which in somewhat later times was enclosed within a low wall of stones. Of the latter kind were the furnaces in use at Laurion, where the extensive deposits of argentiferous lead ore had been worked many centuries before Roman times.

The same type of furnace was also in use in Derbyshire, where these rude hearths were employed until the seventeenth century.

Of the Derbyshire lead smelters of that date it is recorded that "they melt the lead upon the top of the hills that lye open to the west: making their fires to melt it as soon as the west wind begins to blow, which wind by experience they find holds longest of all others."

No artificial blast was used and a more simple metallurgical operation cannot be conceived. At Laurion and in Spain, however, the blast pipes which have been found would show that in some cases at least some form of blowing apparatus had been employed. The ore was smelted in these furnaces in a precisely similar manner to that already described under copper (page 241). The metal produced consisted of lead containing nearly the whole of the silver present in the ore, and it was necessary to extract the silver from it. This was effected by the process of cupellation.

The manner in which this operation was conducted by the Romans and by the Greeks is clearly shown by the remains of a silver refinery and the products of the process discovered in Silchester which I examined a few years ago, and by others found in Spain, Gaul, Laurion and Siphnos. The furnace or hearth was of exactly the same character as the primitive cupellation hearth of Japan, except that its upper layers consisted of bone-ash (calcined bones ground to powder) instead of wood-ashes and it was undoubtedly worked in the same way. It is worthy of note here that bone-ash is still employed in modern furnaces although it is gradually being replaced by other materials. The furnace consisted simply of a shallow cavity in a layer of bone-ash partially enclosed by stone or clay slabs in such a manner that a small chamber was formed around and above it. A charcoal fire was made in the chamber and the lead to be desilverized was placed on it and melted. When sufficient had accumulated in the furnace cavity the fire was raked off towards the sides, a blast of air was then introduced, by which the lead was oxidized, the lead oxide formed being absorbed by the bone-ash and a cake of silver, which also contained any gold that had been present in the ores, was left in the cavity. The

[1] Pliny's account of the treatment of argentiferous lead at the mines in Spain is extremely obscure. A strict interpretation of the passage would ascribe to silver a property which it does not possess, namely that of floating on lead as oil on water. If, however, it is permissible to suppose that the words *plumbum* and *argentum* have been transposed in copying the old manuscripts, and if *plumbum* may be taken to mean the product of the oxidation of *plumbum nigrum*, then the obscurity disappears and the elements of an outline sketch of the process are clearly presented. *Nat. Hist.*, xxxiii, p. 31.

silver resulting from the process when the lead ores were pure contained but small quantities of impurities and was regarded as pure by the Greeks and Romans as it is by the Chinese at the present day.

The silver from impure ores was sometimes impure from the presence of copper, etc., and was then again cupelled with pure lead in another but similar furnace.

The Japanese were especially skilful in conducting these processes, Plate XXVIII, Fig. 1,[1] and seem to have had no difficulty in producing silver of considerable purity by their means.

I have assayed the silver thus treated very often, and the most impure Japanese specimen I have ever found contained 97·5 per cent. and the purest 99·7 per cent. silver. Its average composition deduced from the assays of 555 samples was 99·0 per cent. silver. Even in very ancient times, during the period of the dolmen builders, the Japanese seem to have been skilled in the metallurgy of this metal, as the silver beads of that date contain but very small proportions of lead and copper.

That the Greeks and Romans were not less skilful in conducting this process is proved by the high percentage of silver contained in many of their issues of coins, for which this silver was undoubtedly employed.

Thus the tetradrachmas of Athens sometimes contain 98·3 per cent. silver, and the coins of the Romans, especially during the periods of the Republic and of the Empire up to the time of Nero, and again with a few exceptions from Constantine to Justinian, frequently contained 98 to 99 per cent. silver. When the percentage of silver falls to 97 per cent. it is the result of either careless work or of an intentional stoppage of the process before the refining is completed. Much lower percentages as 95·0 and below indicate the intentional addition of copper.

It has been asserted by a Continental author that the production of silver by the cupellation of lead was unknown in Mycenaean times. But this assertion is based on imperfect data, in the absence of a quantitative chemical analysis, and on a superficial acquaintance with metallurgy. He states that the silver from Mycenae was very impure because, besides gold, it contained copper and antimony. Now gold and copper are universally present in cupelled silver, antimony is by no means uncommon in very small quantities. That antimony was not present in larger proportions than are found in cupelled silver is proved by the forms and workmanship of the Mycenaean cups and vases. A very small quantity of antimony renders silver so exceedingly brittle that if it were present in more than traces it would have been quite impossible to construct these vessels.

I append in the following table the analysis of:—

1. A silver bar from the "burnt" city at Hissarlik (Schliemann).
2. A silver vessel from Mycenae (Schliemann).
3. A Roman patera (British Museum).

[1] *Archaeologia*, vol. lvii, p. 120. Reproduced by permission of the Society of Antiquaries.

No.	Silver.	Copper.	Gold.	Iron.	Lead.	Nickel.	Analyst.
1	95·61	3·41	0·17	0·38	0·22	—	Roberts-Austen.
2	95·59	3·23	0·30	0·12	0·44	—	Percy.
3	95·15	3·44	0·47	0·07	0·33	—	Gowland.

Now Roman silver was undoubtedly obtained from argentiferous lead by cupellation, and as the specimens from Mycenae and Hissarlik are practically identical in composition with it, the silver of which they consist must have been obtained by the same process.

In this connection the assays of Roman silver objects in the British Museum, which I have been permitted to make through the courtesy of Sir Hercules Read, are of considerable interest.

They gave the following percentages of silver :—

Spoon, 95·64; dish, 94·30; dish, 92·50; rim of vessel, 95·52; bottom of another vessel, 94·90; patera, 95·15; large dish, 95·09.

In these assays the proportion of silver present ranges from 92·5 to 95·6 per cent., which would almost seem to indicate that this composition was aimed at by the Romans for what may be termed silver plate and was of the nature of a definite standard.

In the history of culture the discovery of silver and the application of the metal to useful purposes play a minor yet by no means an insignificant part. Less widely distributed than copper and more difficult to extract from its ores, wanting in the properties which made bronze so valuable for implements and weapons and in early times less abundant than even gold, it seems to have been but little used until a few centuries before Mycenaean times.

In North Europe silver was almost entirely unknown or at least unused in pre-Roman times, and even in South Europe it is of rare occurrence in the Bronze Age. In the pile dwellings of the European lakes it has not been found excepting in association with objects of the Iron Age, nor has its occurrence been noted in the *terra maræ* of the Po valley. Probably the earliest specimen is a pin, which was found in Central Italy and has been ascribed by Montelius to the first part of the Bronze Age, to which he gives the date 2100 to 1950 B.C.

The localities whence the ancient peoples of the Mediterranean region derived their silver were all within comparatively easy reach. The deposits of Macedonia, Thrace, Laurion, Siphnos, Sardinia, the south-east of the Euxine and the west of Asia Minor were all available to the Minoans and Mycenaeans, whilst in the times of Phoenician maritime enterprise and of Greek and Roman ascendancy, Spain especially, Gaul, Britain, Dalmatia, and numerous sites in Asia Minor all afforded more or less abundant suppplies of the metal. In Asia Minor the remains of old workings have been discovered in many places, notably in the back country to the south, south-west, and south-east of Trapesne (mod. Trebizonde), Northern

Armenia, Anatolia, and near Balia on the north-east of Mount Ida, and several have been reopened and are now worked by mining companies.

It is difficult to arrange in exact chronological sequence the ancient silver objects which the excavations and researches of archaeologists have revealed to us. Some of the earliest present such technical skill, not only in the purification of silver but also in its fabrication into elegant and graceful forms, that it would almost seem as if the very first examples of the use of the metal had not come down to us. It should, however, be remembered in relation to this, that long prior to the utilization of either of the precious metals, copper and bronze objects, perfect in workmanship and excellent in design, were not uncommon, and in the manufacture of these the metal workers had acquired great experience and skill in the fashioning and decoration of metals.

For the earliest use of silver there is much evidence to show that we must pass eastward out of Europe into Asia, but in which parts of Asia lay the original home of silver, whether in the east in China or in the west in Asia Minor, the data for arriving at an absolutely definite conclusion are insufficient.

The earliest use of the metal has been claimed for China, where as early as 2400 B.C. three metals are said to have been used as barter, the yellow, the white, and the red, namely, gold, silver, and copper.

It was without doubt known in that country in very remote times, but Chinese chronology, whilst possessing the quality of precision, lacks that of accuracy, so that it is quite impossible to assign an even approximate date to most of the records contained in the ancient books.

But it is almost certain that for the oldest objects of silver yet found we have to go to Western Asia, where some remarkable specimens of early work in silver have been unearthed by the excavations of Schliemann at Hassarlik, which, in fact, if the dates attributed to the strata in which they were found are correct, are the most ancient examples of wrought silver in the world.

They consist of a silver pin, an ear-ring and a piece of wire, which were found in the lowest city, to which the date 3000 to 2500 B.C. has been ascribed by Tsountas and Manatt.

In a higher stratum, containing the remains of the Third City (2500 to 2000 B.C.), the prehistoric fortress of Dörpfeld, there was quite a wealth of silver vessels and objects, comprising eleven vases, goblets, jugs, etc., six silver bars, some personal ornaments as well as crucibles in which gold and silver had been melted.

Several of the vases and goblets are of graceful forms and delicate workmanship, indicating not only remarkable technical skill in the working of the silver, but also that the metal had been refined by the process of cupellation. That this process had been employed in the purification of the silver, which has been used for the silver bars, I have already shown on page 264.

As regards the Minoans, the comparative absence of silver objects at Knossos is difficult to understand, in view of the facts that they were specially distinguished as a sea-faring people, and must, therefore, have had communication with the silver-

bearing regions near the coast of the Aegean and of Asia Minor, and their vessels and utensils of bronze and their work in gold testify to their skill as artificers in metal. The only explanation that seems possible is that the city was not only destroyed by fire, but was plundered before its destruction. On the other hand, objects of the metal should have been found in the tombs.

Somewhat later in time, at Mycenae (about 1600 to 1200 B.C.), in addition to the wonderfully lavish employment of gold, we find silver also freely in use, chiefly for the fabrication of vessels, some of which are of imposing size, notably a silver vase found in the First Sepulchre, which is 2 feet 6 inches high and 1 foot 8 inches diameter at the body.

They are generally plain, and when ornamented with repoussé or other designs the artistic work is inferior and coarser than that executed in gold.

The famous cow's head with golden horns, found by Schliemann in the Fourth Sepulchre at Mycenae, a perfect specimen of artistic modelling, and one of the Vaphio cups form, however, exceptions to this rule.

An analysis of a portion of one of the vases from Mycenae was made in Dr. Percy's laboratory. The analysis is given in the table, page 266, where it will be seen that its composition is practically identical with that of one of the silver bars from Hissarlik, and that silver refined by cupellation had been used in its fabrication.

In a later age the Homeric poems testify to the importance of silver as a valuable metal for vessels of various kinds, and to its manifold applications to the ornamentation of furniture, chariots, weapons, etc.

Alybe, on the southern shores of the Euxine, is mentioned as the home of silver, from which it would appear that the famous argentiferous deposits of Laurion in Attica had not been discovered. Greece was then evidently dependent on Phoenician commerce for its supplies of silver and silver wares.

In Chaldaea there is quite an absence of silver in the early graves which have been explored at Warka and Mugheir, yet amongst the remains not only copper, bronze, and gold, but also lead and iron were found. As lead occurs, the absence of silver is the more remarkable. It is very difficult to account for this, in view of the comparative abundance of the metal at Hissarlik. The source which furnished the early inhabitants of the Troad with silver was probably the mining district to the south-east of Trebizonde and south-west of Asia Minor, and these were accessible to the Chaldaeans, and they must have been acquainted with the ore deposits of Armenia and Kurdistan, otherwise whence did they obtain their copper and iron?

Moreover, the records of somewhat later times show that the metal was received as tribute, formed part of the spoils of war, and vast amounts had accumulated in Nineveh.

In Egypt there is a marked absence of silver objects in early times, which is difficult of explanation. Silver wire and silver rings of the XVIIIth dynasty, about 1600 to 1400 B.C., have indeed come down to us, but they are the only examples of the use of the metal in the country until a comparatively late date.

In the wrappings of mummies, gold ornaments were frequently employed, whilst those of silver are rare.

As there are no silver mines in Egypt, the metal was probably first obtained from the refining of the electrum of the Nubian gold mines, and later from the deposits in Asia, or as spoils in war.

In the course of centuries, however, silver had accumulated to an extraordinary extent, if the accounts of the destruction of Thebes by Cambyses (526 B.C.) are only approximately true, when it is said that an almost fabulous amount of the metal, exceeding sixty tons in weight, was taken out of the rubbish.

It might be supposed that the paucity of discoveries of silver objects of very remote times might be due to the destructive action of the weather, or of salts in the soil, on the metal. This is, however, by no means true. The metal resists well the action of all corrosive agents, commonly present in the air, rain and soil, excepting chlorides. In rain chlorine as sodium chloride is always present, it is also present in the soil. Hence silver objects which have been long buried are always more or less converted into silver chloride. Sometimes they are wholly changed into this substance, but generally a small unaltered core of silver exists within them which enables them to retain their shape. Even when completely changed into silver chloride their form is more or less retained; silver chloride, however, although comparatively soft and sectile is a very indestructible substance, so that even these ought to be found.

Equally noteworthy with the peoples already mentioned are the Phoenicians, about whom much has been written, often in error, as our knowledge of them is very far from being so complete as might be desired, and there are good grounds for holding that much which has been attributed to them really belongs to the early Aegean peoples.

If the predominance of Sidon was reached in the tenth century B.C., and the supremacy of Mycenae came to an end in the twelfth century, the Phoenicians would seem to have been a great maritime people in late Mycenaean times and to have continued so for several centuries until the Greeks had wrested the sea power from them.

They were then the merchants and traders of the world and as such had become rich in silver, which they obtained from Spain, Gaul, Thrace, the silver-bearing districts in Asia Minor already mentioned, and probably Laurion, and which they distributed in the form of finely wrought bowls, cups and other objects of the metal through the Aegean and other regions of the Mediterranean.

Another ancient people, the Etruscans, are more noted for their bronze and iron than for their possessions of silver. Yet the excavations, which have been made on the ancient sites in Etruria and the explorations in the tombs tend to show that silver was in use to a considerable extent. Personal ornaments are rare, and the metal appears to have been chiefly used for bowls and vessels for domestic use, mounts for furniture and the like. In the famous Regulini Galassi

tomb (eighth or ninth century B.C.), whilst the objects of gold are numerous those of silver are but few.

There is no evidence of silver mining in their territory, hence the metal must have been obtained by commercial intercourse.

In Italy proper there are no deposits of silver-bearing ores, hence in the early days of Rome what little silver was required had to be obtained from without.

In later times, at the close of the First Punic War (241 B.C.), the valuable mines which had been exploited by the Phoenicians in Sardinia came into the possession of the Romans. About forty years later, as one of the results of the Second Punic War, the Phoenicians had to relinquish to them the mines of Spain, the most valuable in the ancient world.

From that time the wealth of the Romans in silver must have equalled if not exceeded that of the earlier nations of antiquity.

Lead.

The metal lead, although it must have been one of the first metals, if not the first, to be obtained by the reduction of ores, on account of the low temperature required and its great fusibility, requires but a brief notice, as being entirely wanting in the physical properties needed in weapons and implements and worthless as a constituent of bronze; it was wholly without influence on the culture of the Bronze and Iron Ages. In fact, it could be and was only utilized by the peoples of antiquity after they had made those great advances in civilization which characterize the Chaldaean, Assyrian, Egyptian, Greek, and Roman nations at the height of their supremacy.

As I have already pointed out the intimate connection existing between the metallurgy of lead and silver, and have described under the latter metal the smelting of lead ores, it is unnecessary to further consider the method of obtaining lead.

As to the time when the metal was first known to man, there is as yet no absolutely decisive evidence. So far as my investigations have gone, it has not been found amongst any remains which can with certainty be attributed to the earliest Metal Age in Europe. Neither does it occur as a constituent of the metal of any implement or other object of that time, excepting in comparatively small proportions.

But near the close of the Bronze and during the early part of the Iron Age, lead frequently appears in considerable proportions as a constituent of bronze, and when more than about 8 per cent. is present it has undoubtedly, in nearly every case, been intentionally added.

The following analyses in illustration of this may be cited :—

	Copper.	Lead.	Tin.	Iron.	Analyst.
Sword (Ireland)	83·50	8·35	5·15	3·00	Davy.
Cauldron (Scotland) ...	84·08	8·53	7·19	0·03	G. Wilson.
Socketed celts (Brittany)...	—	28·5 to 32·5	Trace to 1·50	—	Paligot.

In these copper-lead-tin bronzes it will be seen that the percentages of lead present range from 8·35 to as much as 32·5. In consequence of this they are so deficient in hardness and toughness that they are unsuitable for weapons or implements. It is hence difficult to conjecture why the socketed celts should have the composition given, unless they may have been intended merely as appurtenances of sepulture and not as implements for actual use.

Objects of lead of the Bronze Age are but few in number. They consist only of unimportant articles, such as sinkers for nets and the like. Three socketed celts of the metal have indeed been found, but they must have been worthless for any practical purpose.

This is somewhat remarkable, as in many localities in Europe rich lead ores then cropped out at the surface of the ground; and it is hardly conceivable that the men who were able to smelt the difficult ores of copper should have either overlooked or been unable to treat the easier ores of lead.

None of the leaden remains which have been found are earlier in date than the palstave or the socketed celt in either Britain, France, or Spain.

The paucity and the trivial nature of these objects indicate clearly that the part played by lead in the culture of the time was of an insignificant character, and the metal was probably but little sought after.

If we now turn to Western Asia we find a remote antiquity has been established for lead, by the discoveries of Schliemann at Hissarlik.

In the Lowest City (3000 to 2500 B.C., Dörpfeld) the metal occurs in shapeless lumps. They are perhaps the most ancient specimens of lead in the world.

In the Third City (2500 to 2000 B.C.) a figurine, and in the Fourth City (2000 to 1500 B.C.) a diminutive wheel, both of lead, were unearthed.

The sources whence the people of the prehistoric towns at Hissarlik could obtain the metal were not far distant, in fact they lay at their very doors. In the mountain district to the north-east of Mount Ida, in Mysia, and at various points on the range of which Mount Olympus forms the prominent peak on the frontiers of Mysia and Bithynia, there are considerable deposits of argentiferous galena, and these it was which furnished the lead.

It may be mentioned in this connection that the sites of several of the ancient workings for ore in this district have been exploited in recent years, notably at Hodsha-Gernish (Balia) to the north-east of Mount Ida, and at Karie-Sennluk and near Broussa on the Olympus range, and have yielded both lead and silver.

For the culture of the primitive age represented by these remains it is evident that lead had but little importance, it is not, in fact, until the development of Mycenaean civilization had made considerable progress that it appears as a metal applied to useful purposes on a wider range.

It was still, however, but scantily used. Discs of lead similar to those at Hissarlik were discovered at Mycenae, in the Vaphio tomb, and in the beehive tomb of Thoricas, but at the island fort of Gha in Lake Copäis, in Boeotia, it was

found in the form of plaques, which are supposed to have been. used for clamping door jambs to walls.

At Tiryns it was found in the citadel, to which the date 1800 to 1600 B.C. has been ascribed, and in many places. Of these discoveries Schliemann writes: "There were found numerous fragments of large vases and jars bound together with clamps of lead, as well as occasional lead clamps, which must have served the same purpose. We found, also, many large melted lumps of lead, as well as one large piece in the form of half a pig, and several fragments of sheet lead."

Specially worthy of note is a leaden statuette which was found by Dr. Tsountas in a beehive tomb in Laconia. It is a casting of remarkable merit, and as it probably exemplifies the elementary costume of the Mycenaean people, it is also of great archaeological interest.

"Great leaden jars, as much as 3 feet high, used mainly for storing grain," are mentioned as being in use in the Mycenaean Age, but I have so far failed to find any record of the actual discovery of such vessels.

The rich deposits of argentiferous galena, which occur on an extensive scale in the region of Laurion in Attica, afforded the Mycenaean people ample supplies of both lead and silver. These deposits, in the earliest times, as is shown by the numerous superficial workings, were exposed at the surface of the ground, and I think there can be little doubt that the mines of Laurion, so famous in a later age, had been previously worked by them.

The discovery of three domed tombs, containing undoubted Mycenaean remains, at Thoricos, in the mining region of Laurion, in the vicinity of many primitive superficial mining excavations, affords very strong evidence indeed in favour of this view.

If we pass now to another region of ancient civilization, the country lying between and adjacent to the Rivers Euphrates and Tigris, the rarity of the discoveries of lead which have been made there further emphasizes the limited use to which the metal was put in early times.

In Babylonia there is no positively certain evidence, *i.e.*, evidence derived from actual discoveries, that lead was in extensive use. On the other hand it is recorded by Herodotus, who visited Babylon about the middle of the fifth century B.C., that a bridge built across the Euphrates by the Queen Nikotris had its stones bound together with iron and lead.

The metal, too, is said by Diodorus to have been largely employed in the construction of the famous hanging gardens of the capital city. Loftus obtained a jar of the metal and a fragment of a pipe at Mugheir (Chaldaea). It has also been taken from some of the oldest graves at Warka. No specimen, however, is to be found in the extensive collection of Chaldaean objects in the British Museum.

In Assyria the excavations which have been made from time to time on the site of the ancient capital and other cities have brought to light but few objects of lead. Layard mentions a mass of lead melted by the fire, which had destroyed the

temple in the ruins of which it was found. Yet the Chaldaeans and Assyrians were very favourably situated for obtaining the metal.

In the mountain region to the north-east of Nineveh and not very far distant, in the neighbourhood of Lizan, and in the valley of the Birwari there is an important mineral district, throughout which are distributed valuable deposits of lead ore.

The still richer districts of South Armenia, near the modern Diarbekr on the upper waters of the Tigris, were also by no means inaccessible to them.

As regards Egypt, no deposits of the ores of lead are known to occur within its borders, or in the regions on its frontiers, and it is probably for this reason that the metal was but very rarely used, even in comparatively late times. In fact, even as late as the Ptolemaic period it was employed by the Egyptians to a much lesser extent than by the Mycenaean people, and its applications were confined to very trivial uses.

As a constituent of bronze it seems to have been much in favour, thus in twenty-two analyses of Egyptian bronzes, chiefly statuettes, published by von Bibra, fifteen show from 7 to 22 per cent. of lead.

The earliest example of the use of lead as metal is a hawk of wood coated with lead, which was found by Petrie in a grave at Nagada, along with three similar archaic figurines of limestone.

If this is contemporaneous with the early objects found on that site, to which the date 3300 to 3000 B.C. has been ascribed by Petrie, it rivals the Hissarlik specimens in its remote antiquity.

The Phoenicians claim our attention as the discoverers and first exploiters of the lead and silver-bearing deposits in Sardinia and Spain, and possibly those of the Taurus and some others on the western and northern coasts of Asia Minor, and in the valley of the Nestus, in Macedonia. According to the statements of classical authors they were especially noted for the abundance of silver which they possessed, but, as I have already pointed out (page 263), silver can only be obtained by smelting ores containing lead, they must, therefore, have been well acquainted with that metal. None of the sites of these ancient cities or settlements have, however, yielded any evidence of the use of lead, excepting for minor purposes.

We have already noted how lead was applied to various industrial purposes in Mycenaean times.

If we now pass in review its applications during the later period of Greek culture, from the beginning of the Hellenic supremacy in the Aegean up to its fall at the hands of the Romans, we shall see that they were still but little extended and for the most part of but minor importance.

In architecture, lead was employed in the form of dowels for fastening firmly together the larger stones of important edifices, also for affixing to them the bronzes with which they were occasionally adorned. Examples of both are seen in the debris of the Mausoleum, at Halicarnassus.

For civil and religious purposes we find inscribed tablets, plaques, and figurines for votive offerings.

For the needs of common industries there were weights, plummets, and the like, and for the purposes of warfare, sling bullets of lead.

All these are, however, applications of minor importance, consuming but insignificant quantities of the metal.

The sources whence the metal was obtained were the mines of Laurion, the islands of the Aegean, and the west and north of Asia Minor.

During the early part of their history, the Romans were not in advance of other nations in the utilization of the metal lead, but with the growth of the empire it gradually came into more extensive use, until at last it was applied to almost every purpose for which it is employed at the present day.

At the close of the Punic War, as we have seen already, the valuable mines which had been exploited by the Phoenicians in Sardinia and Spain came into their possession, and somewhat later the famous mines of Laurion in Attica.

Most of these mines were, however, worked rather for the silver which the lead contained than for the lead itself, although even under those circumstances the production of the latter metal must have been considerable.

But with the occupation of Britain vast supplies were at once available from the rich ores which abounded there even at the surface of the ground in several localities, so that from about the first century of our era began that lavish use of lead for which the Romans became specially noted.

The Sardinian lead mines must have been very vigorously carried on by them, as the accumulations of slag mixed with Roman remains in the province of Iglesias are of such enormous extent that for many years they have furnished material for the extraction of lead and silver to the smelting works at Domusnovas, Cagliari, and several other places in the province.

The lead mines in Spain, until the discovery of those in Britain, were the most valuable in the ancient world, in Roman, as in Phoenician times, not even excepting the famous mines of Laurion.

The most important of the Roman mines were in the southern part of the Spanish peninsula, but others of considerable extent were also worked near Barcelona, and the hill district of Asturias. The chief seat of the lead and silver mining industry was Carthagena. Here and in the vicinity, and at Linares and Almeria, and even further westward, there are numerous vast heaps of ancient slags, chiefly Roman.

Other interesting relics of Roman lead smelting in the country are figurines of lead, fifty of which were found near Orihuelva (Valencia). One of these is in the Museum of Practical Geology.

Several other localities, in addition to those enumerated, are noted by ancient writers, but it has not yet been possible to determine their sites from existing remains.

As regards the two famous mines mentioned by Pliny,[1] the Santarensian and

[1] Pliny, *Naturalis Histori*, xxxiv, 17, 49.

the Antonian mine in Baetica, there can be little doubt that they were situated in the mining region between Carthagena and Almeria or near Linares, as there are no accumulations of mining and smelting debris in any other districts, which, in any way, correspond with the extent of their operations as recorded by Pliny.

The lead mining operations of the Romans in Gaul, judging from the metallurgical remains which have come down to us, and the evidence afforded by ancient excavations, were conducted on an insignificant scale. The ores were not only much less abundant, but their mode of occurrence was also less favourable than in the Spanish peninsula.

Pigs of lead, bearing the names of the Emperors Nero, Hadrian, and Septimus Severus, have been unearthed respectively at Vieil, Evreux (Dept. Eure), Lillebonne (Dept. Seine Inferieure), and Chalons-sur-Saône (Dept. Saône-et-Loire). These localities are far distant from any lead mining district, and as the pigs closely resemble those found in England, Abbé Cochet hence attributes them to Shropshire.

The importance of Britain to the Romans as a lead-producing country is indisputably proved by the extensive mining excavations, and the vast quantities of mining debris and metallurgical *residua* which they have left in the chief ore-bearing districts, also by the number of pigs of lead, bearing imperial and other Roman names, which have been found either at the mines or on the roads leading from them.

The most important centres of Roman mining were:—the Mendip Hills (Somersetshire); the district of the Stiperstones and its subsidiary hills (Shropshire); the hill region of North Derbyshire; and the neighbourhood of Holywell (Flintshire).

More than fifty Roman pigs of lead have been found in Britain, either in the neighbourhood of the ancient mines where they were produced or near the roads leading from them to Roman stations. This large number, all of which may be regarded as having been accidentally lost, taken together with the vast extent of the Roman mining excavations and accumulations of slag and other debris, indicates in a very forcible manner that the production of lead in Britain during the Roman occupation must have been exceedingly great.

These pigs were found near, or can be traced to, the following mining centres:—

Somersetshire. Eight pigs, the earliest bearing the name Britannicus (A.D. 44 to 48–9).

Shropshire. Four pigs, all bearing the name of the Emperor Hadrian (A.D. 117 to 128).

Flintshire. Twenty-eight pigs, the earliest bearing the name of the Emperor Nero (A.D. 60 to 68).

Derbyshire. Ten pigs, the earliest having the name of the Emperor Tiberius Claudius (A.D. 44).

The most extensive applications of lead that had yet been made in the history of the metal were those that arose out of the elaborate systems for the supply and

distribution of water in cities and the construction and equipment of baths, which formed such an important feature in the social life of the Romans.

The chief forms in which it was used for these purposes were sheets and pipes. The former, of which numerous specimens have come down to us, were of very varying dimensions, ranging from the small strips unearthed at Silchester, barely thicker than paper, to the large and ponderous plates which were used in the construction of the baths at Bath, which are nearly $\frac{5}{8}$ inch in thickness.

The water pipes varied from 2 or 3 inches to 18 inches in diameter. They often bear inscriptions, which are always in relief, and were formed on the sheet of which the pipe was made by casting it in a stamped mould, as was the case with the pigs. The inscriptions consist generally of the name of the Emperor, the officer having charge of the regulation of the water supply, the plumber, and often the owner of the house.

They sometimes indicate, too, that the water was an imperial concession. Amongst the plumbers it is interesting to note a number of female members of the craft.

As a material in construction, we find it sometimes run into the joints of masonry as a binding substance, also as dowels, and for fixing metal clamps and plaques to blocks of stone. Bronze statues which were imperfect castings were repaired with lead. Others had their stability increased by filling their bases with the metal.

A noteworthy use was the construction of coffins. A considerable number of these have been dug up from time to time, both in our own country and in France; a few only survive, the others having been consigned to the melting pot.

Lead was also largely used as a constituent of pewter and solder and for most purposes for which it is employed at the present day.

For these needs vast quantities were required, and hence it was that the mines of Spain and Gaul, but more especially those of Britain, were worked with such assiduity and perseverance.

Iron.

The belief held by some archaeologists that the first iron known to man was either of meteoric origin or telluric native iron is not supported by any substantial evidence. It is true masses of telluric iron occur at Ovifak in Greenland and have afforded the Eskimo, as we have already seen, material for tools and weapons. Also the doubtful meteoric iron of the Toluka Valley in Mexico is worked there into axes and other implements.

But in the few other localities where telluric iron has been found in basalt and other rocks the metal occurs in grains or in nodules too small for practical use, and in three cases contains from 65 to 75 per cent. of nickel.

The rare occurrence of iron, either meteoric or telluric, further the impossibility of detaching pieces suitable for working from almost all meteorites by means of stone or bronze tools, is opposed to the belief that such iron was the material used by the men of the Early Iron Age.

Further, the assumption which is sometimes made that one or other of these forms of iron must have been the earliest source of the metal is not only without any solid foundation, but is totally unnecessary, for, as will be shown below, iron ores are so easily reducible that they can be converted into metallic iron in an ordinary wood or charcoal fire.

From the foregoing remarks I think it will be evident that native iron, whether of meteoric or telluric origin, can have played no part in the rise and development of the Iron Age.

The view held by some that meteoric iron is not malleable and hence could not have been utilized is, however, untenable, as, according to the researches of Dr. Beck, out of 70 iron meteorites (siderites) 48 were malleable whilst only 7 were absolutely unmalleable.[1]

The discovery of the metal iron, in my opinion, arose either from pieces of rich iron ore becoming accidentally embedded in the domestic fire, the burning embers of which would easily reduce them to the metallic state, or it may be from primitive man having already obtained the metal copper from certain stones experimenting with others in the same manner in his rude furnaces, when, if these consisted of iron ore, lumps of malleable iron would certainly be produced.

So easily, in fact, is the metal iron reduced from its ores that it is extremely strange that it was not the first metal discovered by neolithic man.

It has been and is still asserted by some archaeologists, owing to an imperfect acquaintance with metallurgy, that the extraction of iron from its ores requires a greater knowledge than the extraction of copper, also that a higher temperature is required for the former than the latter operation. Both statements are in direct contradiction to the facts established by practical metallurgists—

1st. That there is no simpler process than the production of malleable iron from its ores in a charcoal fire.

2nd. That the temperature required for the reduction of iron is only 700° to 800° C., whilst that required for copper is not less than about 1100° C.

Moreover, as we shall see later, neither bellows nor an artificial blast of any kind is necessary.

No fusion is required in the case of iron as in that of copper; the metal is obtained as an unfused malleable lump, which only needs hammering to fashion it into implements or weapons.

The distinguished metallurgist the late Dr. Percy has so ably stated the metallurgical view of this question in his book *Iron and Steel*[2] that I will quote the passage *in extenso.*

" From suitable ore, of which abundant and readily accessible supplies exist in various localities, nothing more easy can be conceived than the extraction of malleable iron.

[1] Beck, *Geschichte des Eisens*, p. 26.

[2] Dr. Percy, *Metallurgy, Iron and Steel* (London, 1864), p. 873.

"Of all metallurgical processes it may be regarded as the most simple.

"Thus, if a lump of red or brown haematite be heated for a few hours in a charcoal fire, well surrounded by, or embedded in, the fuel, it will be more or less completely reduced, so as to admit of being easily forged at a red heat into a bar of iron.

"The primitive method of extracting good malleable iron directly from the ore, which is still practised in India and in Africa, requires a degree of skill very far inferior to that which is implied in the manufacture of bronze."

The erroneous belief which is still too prevalent among archaeologists even at the present day, that fusion is necessary for the extraction of iron, is evidently founded on the modern method of iron smelting, by which cast iron is first produced and subsequently converted by special processes into malleable iron or steel. This, in spite of the fact that this method only dates from the fifteenth century, when high furnaces and high pressure of blast were introduced by which alone cast iron can be produced.

It should be a matter of common knowledge that before that date all iron was obtained as malleable iron direct from the ore and was never molten but accumulated as a metallic mass at the bottom of the furnace and had to be removed mechanically. No other procedure was possible with the low furnaces or hearths, which were the only appliances then available. The metallic mass was practically nfusible and consisted of grains of wrought or malleable iron of a steely nature and could be readily forged into any required shape.

The evidence afforded by the remains which have been found on the old iron sites proves, I think, incontestably that the actual process for the extraction of iron from its ores in Europe, in fact, in all countries, in early times was everywhere practically the same; it was only in the furnaces and appliances that differences occurred. Moreover, the process was one of the simplest in the whole range of metallurgy, whether the furnace cavity was a simple hole in the ground or prolonged above it. The fuel was charcoal, and this was placed in the furnace, and sometimes also piled above it, in alternate layers with the iron ore. The fire was urged either by the wind alone or by a blowing appliance of some kind to the temperature necessary for the reduction of the ore to metallic iron.

I have again to repeat and emphatically, as so much misconception exists on this point, that the metal was never melted but was always obtained in the form of a solid, sometimes spongy mass of infusible malleable iron, occasionally of a steely character.

No elaborate appliances or tools were needed for the operations. Even at the present day in Ceylon the bloom or mass of iron is taken out of the furnace with long tongs made of green wood sticks tied together at one end and is then beaten a little into shape with thick sticks. In Africa the stem of a creeper is employed for the same purpose, and the bloom is then hammered into shape with a stone, a larger stone serving as an anvil.

The prehistoric process still is practised in Africa, and in a modified form in

India in the Deccan, Central and North-Western Provinces and in other localities, and in Borneo; in Europe, in the province of Catalonia in the north of Spain and in Finland.

In Plate XXVII, Fig. 1,[1] is represented the removal of the mass of iron from a furnace in Catalonia.

In Japan, the furnace which still survives has no parallel in its simplicity, rudeness, and temporary character. Even the earliest furnaces of Europe, so far as we can infer from their vestiges which have been unearthed, were of a more advanced type than it. It consists simply of a V-shaped trough of common clay with holes near the bottom for the introduction of the blast. The furnace is charged with alternate layers of charcoal and ore during about fifty or sixty hours, after which the sides are so much fused and corroded that the operation is stopped, the walls are broken down and the masses of reduced iron containing steely portions removed by levers and bars and broken up when cold. The steely fragments are separated and from them the famous swords of old Japan were made.

A new furnace is at once constructed on the old site and is ready for work in about 24 hours.

From the foregoing, the simple character of the operation necessary for the production of iron in a malleable condition from its ores is clearly manifest.

As regards cast iron the furnaces, until mediaeval times, were too low, and the blast insufficient for its production; it is not impossible, however, that it might sometimes have been obtained in small quantities when the temperature of the furnace was abnormally raised by a violent wind or an accidental increase in the blast and when at the same time an excess of charcoal was present. It could, on the other hand, never have been utilized, as on account of its brittleness it could not be hammered into any useful form and on account of its very high melting point it could not then be remelted and cast.

If it was ever produced, it must have been returned to the furnace with the next charge, as no specimen of early date has yet been found.

It is important to note here that the type of furnace which still survives in India among the hill tribes of the Ghats is closely analogous to the prehistoric furnaces of the upper basin of the Danube, Fig. 5,[2] and of the Jura district in Europe. It consists simply of a cylindrical shaft of clay about 10 to 15 inches in diameter and 2 feet 6 inches to 4 feet in height, with an aperture near the base for the admission of the blast and withdrawal of the iron and another for the exit of the slag. I append a brief description of the working of a charge as the furnaces of prehistoric times must have been worked in the same manner. "The furnace is first filled nearly half full of charcoal and upon this, fire is put, after which it is filled to the top with charcoal. The blast is then applied. When the charcoal sinks at the top of the furnace, alternate charges of ore and charcoal are supplied until the proper charge of ore has been introduced, after which the blast is

[1] Reproduced from Percy, *Iron and Steel*, p. 283, by permission of Mr. John Murray.

[2] *Jour. Iron and Steel Inst.*, 1897, vol. lii, p. 205.

increased and maintained till the close of the operation. The greater part of the slag remains in the furnace and is taken out along with the iron. In from four to

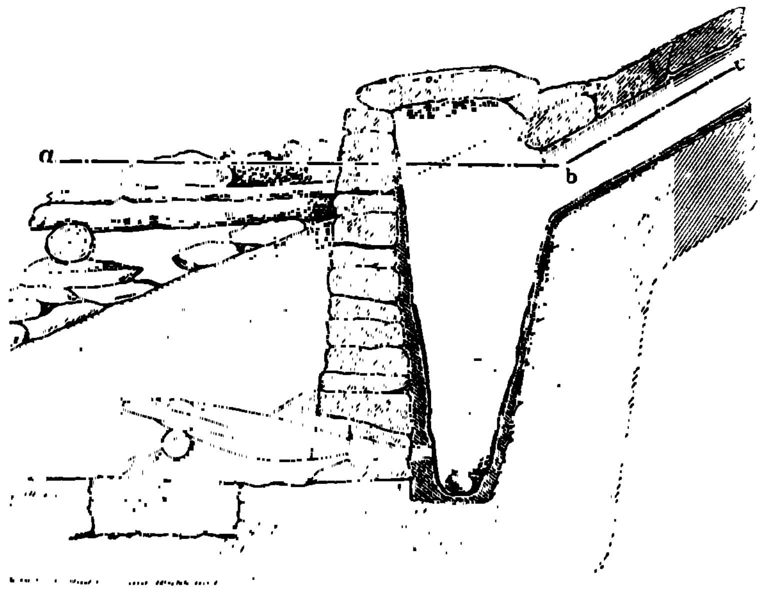


FIG. 5.—ANCIENT IRON SMELTING FURNACE. GYALAR, TRANSYLVANIA.

six hours a charge is completed, when the front of the furnace being removed a small mass of malleable iron, slag and unburnt charcoal is drawn out." The iron is then hammered into a bar.

In Upper Burma a furnace, Fig. 6,[1] of the same type as those still survived

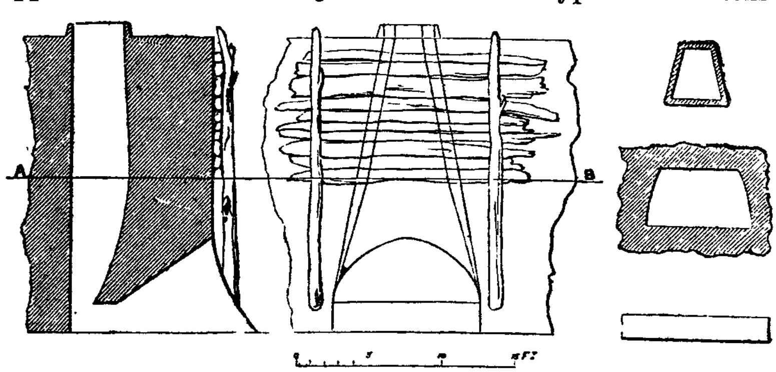


FIG. 6.—IRON SMELTING FURNACE. BURMA.

in 1864, but in the mode of working it was even more primitive, as no artificial blast whatever was made use of. During working, the air necessary for the combustion of the fuel was admitted through a number of clay tubes clayed into the aperture through which the mass of iron was drawn out after the operation No care appeared to be taken in selecting localities where a natural blast might be obtained by making the furnace to face the prevailing wind.

[1] Reproduced from Percy, *Iron and Steel*, p. 272, by permission of Mr. John Murray.

Early iron smelting localities.—In Western Asia there are two important districts where iron ores are of very extensive occurrence and in which remains of early iron manufacture are found.

One is the region on the south-east of the Euxine (ancient Paphlagonia and Pontus), extending from the modern Yeshil Irmak to Batum, and comprising a series of mountain ranges, not far from the coast, along the lower slopes and foot hills of which the iron deposits are scattered.

The other is the Taurus and Anti Taurus region on the south-east of Asia Minor, extending on the West from Cape Anamur to the borders of Syria and in Syria to Aleppo, the Euphrates and Lebanon.

Either of the above sites might have been the earliest for the production of iron in Western Asia, but from a metallurgical point of view, deduced from the extent and character of the ancient remains, there are strong reasons for believing that the first-mentioned region was the first in which the metal was regularly produced.

Iron ore is also found in the Tiyari Mountains to the north-east of the site of Nineveh and in the neighbouring part of Kurdistan and is a source of iron at the present day.

It may be that the ore of the Tiyari Mountains was also treated by the ancient Assyrians for the extraction of iron at a very early period, but either the ore was difficult to work or yielded insufficient or inferior metal, for as early as 881 B.C. the metal was brought to Assyria as tribute from the iron district of the Euxine, the country of the Chalybes, Tibereni, and Moschi of classical writers.

It is also recorded that Ashur-nasir-pal (885 to 860 B.C.) obtained iron in the neighbourhood of Carchemish. In support of these records which testify to the extensive use of iron by the Assyrians we have the remarkable find of Victor Place at Khorsabad. There in the ruins of the palace of Sargon, built about 710 B.C., he found a storehouse containing, according to his estimation, not less than 160,000 kilograms of iron. The greater part consisted of iron bars from 12 to 19 inches in length, and $2\frac{3}{4}$ to $5\frac{1}{2}$ inches in thickness. They were roughly drawn out at each end and pierced with a hole, as shown in Fig. 7,[1] and weighed from about 9 to 44 lbs. Place supposed them to be work tools of some kind, but they are really bars of iron forged at the furnace of the mines into this shape for convenience of transport by men, horses, or camels.

It is worthy of note here that similar forms survived for iron for transport and trading in Roman times and even up to thirty or forty years ago in Finland and Sweden.

The collection was chiefly a store of unworked iron held in readiness by the king for the instruments of war and for building construction. It contained also, however, many kinds of finished iron articles, such as chains, horse bits, etc., all arranged in regular order.

This vast accumulation of iron indicates incontestably that the metal had been in use for many centuries previous to the time of Sargon, so that it will not

[1] Reproduced from Beck, *Geschichte des Eisens*, p. 135, by permission of F. Vieweg and Sohn.

be unreasonable to assume that the Assyrians were acquainted with iron certainly earlier than 1500 or even 2000 B.C.

Layard also, as is well known, found in his excavations on the site of Nineveh many weapons, swords, daggers, lance-heads, arrow-heads, and tools of iron.

Other districts in North Asia where the metallurgy of iron was practised in remote times are as follows :—

In Northern Persia, in the neighbourhood of Parpa, between Kerman and Shiras and not far from Persepolis, there are extensive remains of early iron workings which were doubtless the source of the vast numbers of iron implements and objects found on the plain in the vicinity of that ancient city.

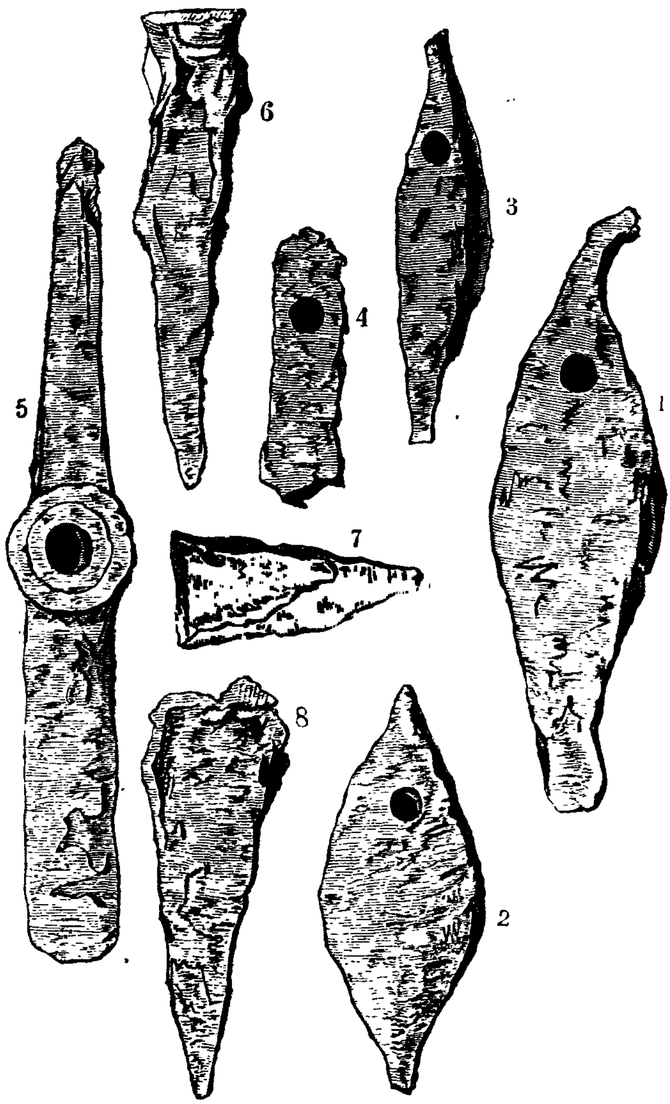


FIG. 7.—IRON FOUND AT KHORSABAD.

Also in Northern Persia in the Karadagh district mounds of prehistoric iron slag of enormous extent have been found.

From these districts, in addition to those mentioned, Nineveh also obtained some iron.

In India iron ores are somewhat widely distributed, and have been worked in very early times, chiefly in the North-Western Provinces, Central India, the Western Ghats, Mysore, Madras, Haiderabad, Kutch, and elsewhere.

It is extremely probable that iron was extracted from them at least as early as the tenth century B.C. in Southern India, and at a much earlier date in the Punjaub, as the metal is said to be mentioned in the Rig-Veda as in use for weapons.

In other parts of the world, as Egypt, Western Asia, and Europe, generally a Copper or Bronze Age had preceded the Iron Age, but the existence of such an

era in Southern India has yet to be proven. Bronze, brass, and copper implements and ornaments have indeed been found in a few instances, but apparently none as yet under circumstances showing distinctly that they preceded the Iron Age.

According to Pliny the best steel was that of Serica, but what country is indicated by that name has not yet been definitely determined. It is extremely improbable that it was China, and we must rather regard the mountain district of Ferghana (Khokand) as the source of Serican steel (Beck).[1] In Chinese annals it is recorded that a prince of Khotan had presented one of the kings with a writing case of "blue iron," doubtless meaning steel. Iron ores are of common occurrence in China, chiefly in the Western Provinces, but there is no concrete evidence to show how early they were worked for the metal.

As to the time of the first use of iron the evidence, too, afforded by the ancient literature is of a very doubtful character. In the Shu-King to which the date 2000 B.C. has been attributed, iron is indeed mentioned, but with this exception—there is no allusion to iron in writings older than about 1000 B.C. (Edkins).

The magnetic compass, however, is said to have been invented by the Chinese at a very remote date, earlier than 1000 B.C., and if so they must then have been acquainted with steel.

The Japanese when they migrated from the mainland were passing out of the Bronze Age stage of culture and entering the Iron Age, as but few weapons of bronze, only halberds and one or two swords, have been found, and these only in those parts of the islands which were first occupied by them. They had already become skilful workers in iron before they became dolmen builders, three or four centuries B.C. No weapons except iron swords, spear-heads, and arrow-heads have been found in the chambers of the dolmens, and all, more particularly the swords, are splendid examples of the work of the smith.

The much disputed question as to the time when iron was first used by man requires our consideration as far as the available evidence will permit. In this connection it is almost unnecessary to point out that the evidence is not only very imperfect, but is also unfortunately in too many cases, especially that based on philology, liable to misinterpretation, hence the question does not admit at present of a decisive answer. However, based on such evidence as is available, the dates given in the following table have been advanced with more or less authority for the discoveries and events to which they are respectively prefixed.

TABLE.

Pre-dynastic times in Egypt. Iron beads.

IVth	dynasty	3733 B.C.	A piece of iron in an inner joint of the Great Pyramid at Gizeh.
Vth	„	3566 „	Several pieces of a pickaxe from Abusir.
XIIth	„	2466 „	A spear-head, Nubia.

[1] Beck, *op. cit.*, p. 255.

	About 2357 B.C.	Iron in use in China according to recent researches in early Chinese history (Brough).
XVIIIth dynasty	1600 to 1400 B.C.	A sickle, Karnak.
	About 2000 B.C.	Pieces of iron in the Second City, Hissarlik.
	„ 1500 „	Iron knife found by Schliemann at Hissarlik.
	„ 1400 to 1300 B.C.	Achaeans enter Greece and, according to Ridgeway, had iron swords.
	„ 1200 B.C.	The Bronze Age shades off into the Iron Age in Crete.
	„ 1100 „	Iron implements at Villanova, North Italy.
	„ 1100 „	Iron in use in Etruria (Montelius).
	„ 1000 „	Iron Age in Greece in the Homeric period.
	„ 885 to 860 B.C.	Ashur-nasir-pal brought iron from Carchemish.
	„ 881 B.C.	Assyria, tribute lists of Moschi.
	„ 800 „	At the destruction of Damascus 5,000 talents of iron were taken.
	„ 800 „	Iron swords in Central Europe (Montelius).
	„ 800 „	Iron Age in Britain (Montelius).
	„ 700 „	Vast numbers of iron implements and trading bars in Sargon's palace.
	„ 700 „	Iron weapons (Hallstatt).

On a perusal of the above table the conflicting and irreconcilable character of many of the dates will be seen to be a striking feature.

From a metallurgical point of view several of the attributions of date appear to be not only inexplicable but highly improbable.

Accepting the dates given for the Egyptian specimens as approximately correct, whence came the few early pieces of iron mentioned above.

The specimen from the Great Pyramid was examined by Flight and pronounced to be non-meteoric, further, it contains combined carbon, and for that and other reasons, already previously mentioned, can hardly be telluric. I hence think it is not altogether impossible that it came from the Sinaitic peninsula, and was obtained there by the accidental treatment by the copper smelters of the rich iron ore which crops out near the veins of copper ore. If this was so the question arises, did the production of iron continue to be carried on there from that time.

In somewhat later times, if we may reason from the heaps of ancient iron slags, Egypt undoubtedly obtained some of its iron from that region.

The rarity of the occurrence of iron implements and weapons in Egypt, up to comparatively late times is inexplicable in view of the intercourse between that country and Assyria, where the metal was certainly in use as early as about 1500 B.C. It is, however, well to remember in this connection that neither have

implements of bronze been found in the numbers that might be expected when we consider the extensive works in Egypt, which could hardly have been accomplished without a metal. As regards the working of stone, in which the Egyptians were especially expert, but few tools suitable for the purpose have been found. These facts would almost lead us to believe either that stone tools were employed or that iron tools may some time be discovered.

In Africa, so far as metallurgical evidence may be relied on, the extraction of iron from its ores was carried on at a very remote date. The seats of an ancient iron industry, marked by accumulations of slags and debris, are so widely distributed in that continent that it must date from a very early period, and, according to Beck, must have been indigenous. That this early African iron smelting was known in Egypt is well shown by Figs. 8 and 9,[1] which are reproduced from bas-reliefs on a stone now in the Egyptian Collection in Florence.

In Fig. 8 a youth, whose head and outstanding ears characterize him as an Ethiopian, is working a drum-like skin bellows from which the blast of air is conveyed to a shallow hole, in which the ore is reduced to metallic iron.

In Fig. 9 we see the lump of iron, which was obtained, being forged on a stone anvil with a wooden base, with a hammer consisting of a stone or piece of iron held in both hands by the smith or "striker."

The date of the bas-reliefs is not known but bellows of precisely the same form are depicted on a wall painting in a tomb bearing the name of Thotmes III. (1503 to1449 B.C.).[2]

In Fig. 10[3] is reproduced a pen-and-ink sketch made by Capt. Grant, who accompanied Speke to Lake Nyanza, of the operation of making malleable iron direct from the ore in that region. The ancient process and form of bellows had thus survived there.

In the earliest times bellows were not used, neither were they necessary, as furnaces still exist and are at work at the present day at Ola-igbi, about 160 miles from Lagos, in which no artificial blast is employed, the wind alone supplying the air required.

From these facts it would follow that it is extremely probable that the sickle of the XIIth dynasty (2466 B.C.) found in Nubia had its origin in one or other of the African smelting sites.

In Assyria, as I have already pointed out, the Iron Age dates from a far distant period.

The records of tribute from the Moschi and the extremely large quantity of the metal found at Khorsabad indicate in my opinion an antiquity for its use which cannot be placed later than 1500 B.C.

On the south-east of the Euxine, the vast extent of the prehistoric slag heaps

[1] Reproduced from Beck, *Geschichte des Eisens*, 1*ste Abth.* p. 97, by permission of F. Vieweg and Sohn.

[2] Wilkinson, *Ancient Egyptians*, ii, 312.

[3] *Quart. Journ. of Sc.*, 1870, vol. vii, Plate, Fig. 1, p. 198.

which are scattered throughout the iron region of the ancient Pontus tend to show that at an even earlier date iron was then extracted from its ores.

As regards India, if the statements of the Rig Veda may be accepted, iron was in use in the Punjaub as early as 1500 B.C.

Further, lance-heads and objects of iron have been found in the graves and burial mounds of the Deccan before the influx of the Hindus; and in the old Indian graves near the Indus, to which the date 1500 B.C. has been ascribed, objects of the metal have also been found (Beck).

In Europe we are confronted with serious difficulties in the determination of the beginning of the Iron Age. Metallurgy would point to two centres, the

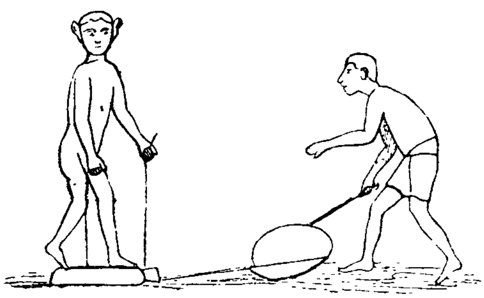


FIG. 8.—EGYPTIAN BAS-RELIEF REPRESENTING IRON SMELTING.

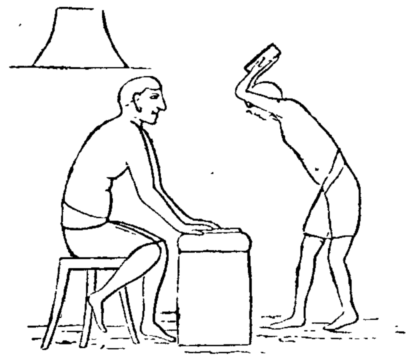


FIG. 9.—EGYPTIAN BAS-RELIEF REPRESENTING THE FORGING OF IRON.

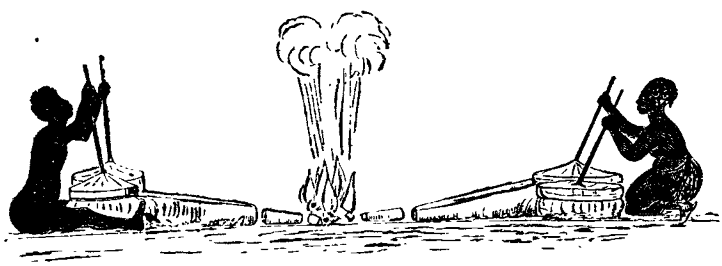


FIG. 10.—MODERN IRON SMELTING NEAR LAKE NYANZA, AFRICA.

Eisenerz district of the Austrian Tyrol and the Elban region (Etruria) of Italy, in both of which there was an advanced Bronze Age culture earlier than 1000 B.C.

From a purely metallurgical point of view iron was first produced in the former region, the country around the upper waters of the Danubian tributaries the Drave, the Save, the Mur, and the Enns (the ancient Noricum). We have there on many sites vast deposits of easily reducible iron ore, at Eisenerz so extensive that the entire mountain is one mass of pure iron carbonate and oxide. So abundant must lumps of the ore have been on the hillsides and in the beds of the streams, that they cannot have failed to have been used as the enclosing stones of the domestic hearths and as I have already pointed out if by chance any became

Ligna accensa A. Ligna quibus utrinque sunt tenuissimæ bracteæ & spade B. Cuniculus C.

FIG. 1.—MINING BY THE AID OF FIRE.

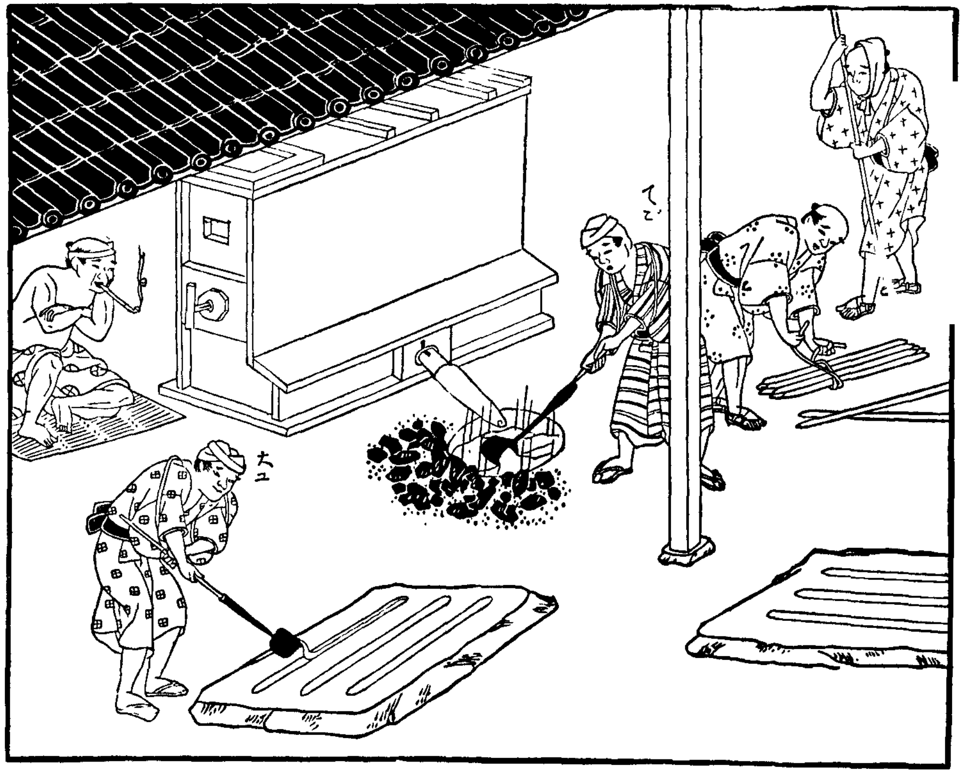
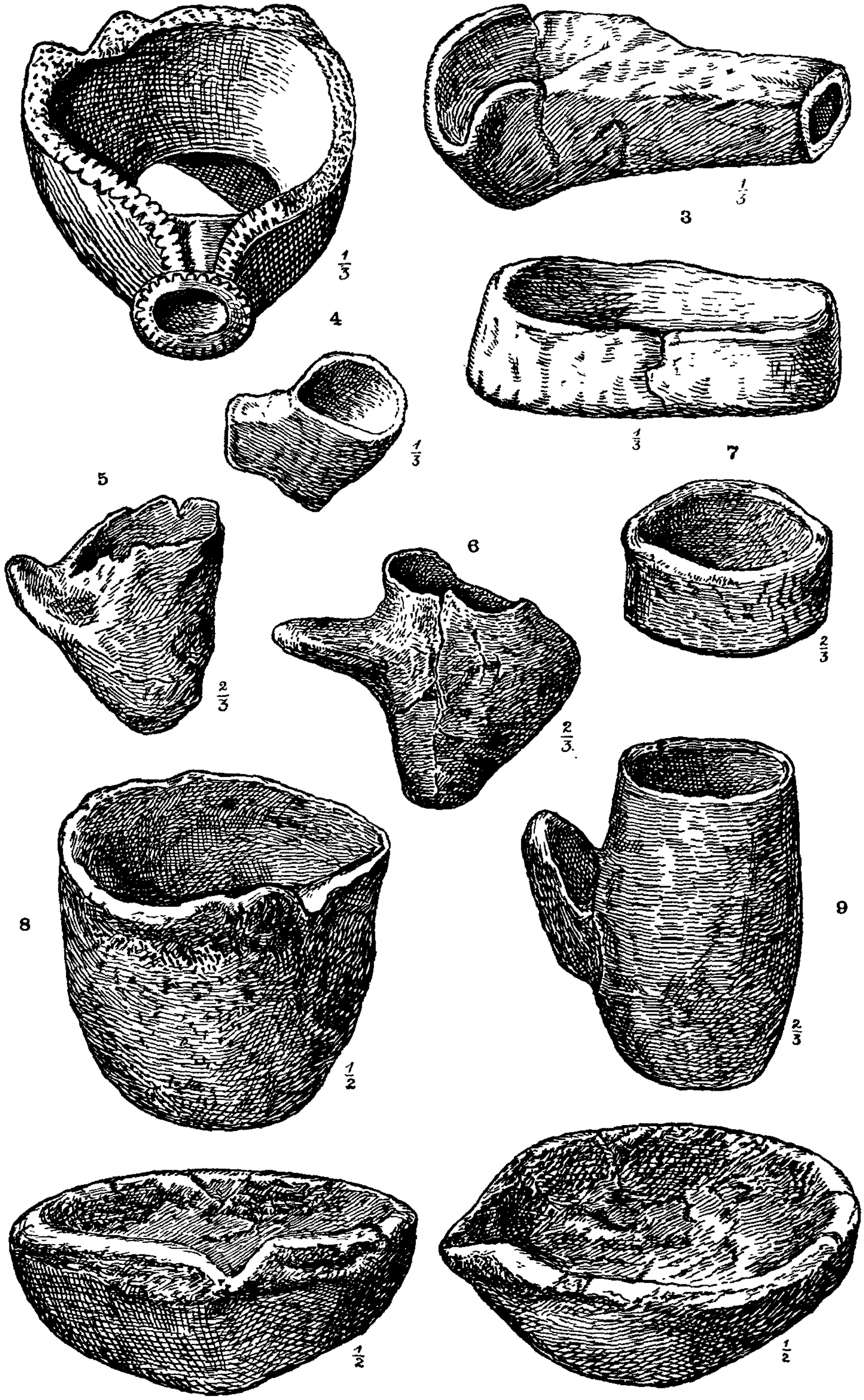


FIG. 2.—TIN SMELTING. JAPAN.

THE METALS IN ANTIQUITY.



PREHISTORIC CRUCIBLES.

THE METALS IN ANTIQUITY.

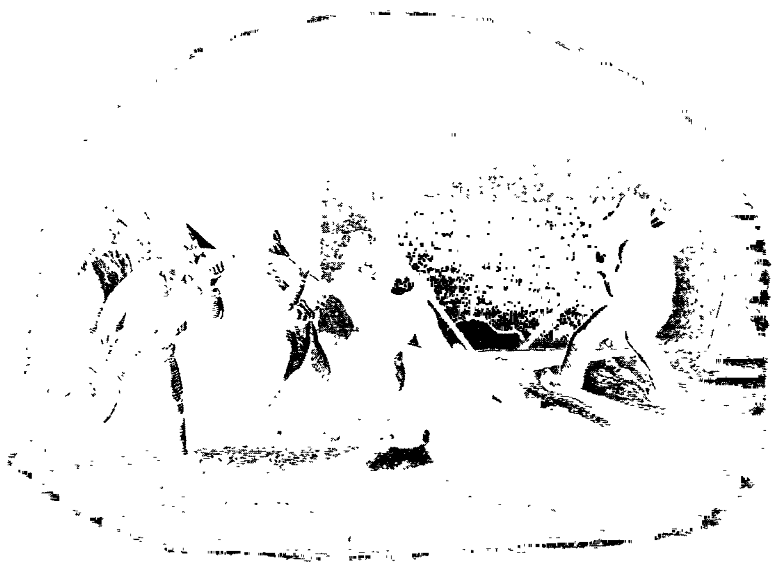


FIG. 1.—REMOVING MASS OF IRON FROM THE FURNACE. CATALONIA, SPAIN.

FIG. 2.—QUERNS USED FOR GRINDING GOLD ORE. FROM ANCIENT MINE, NUBIA.

THE METALS IN ANTIQUITY.

FIG. 1.—EXTRACTION OF SILVER FROM ARGENTIFEROUS LEAD BY CUPELLATION. JAPAN.

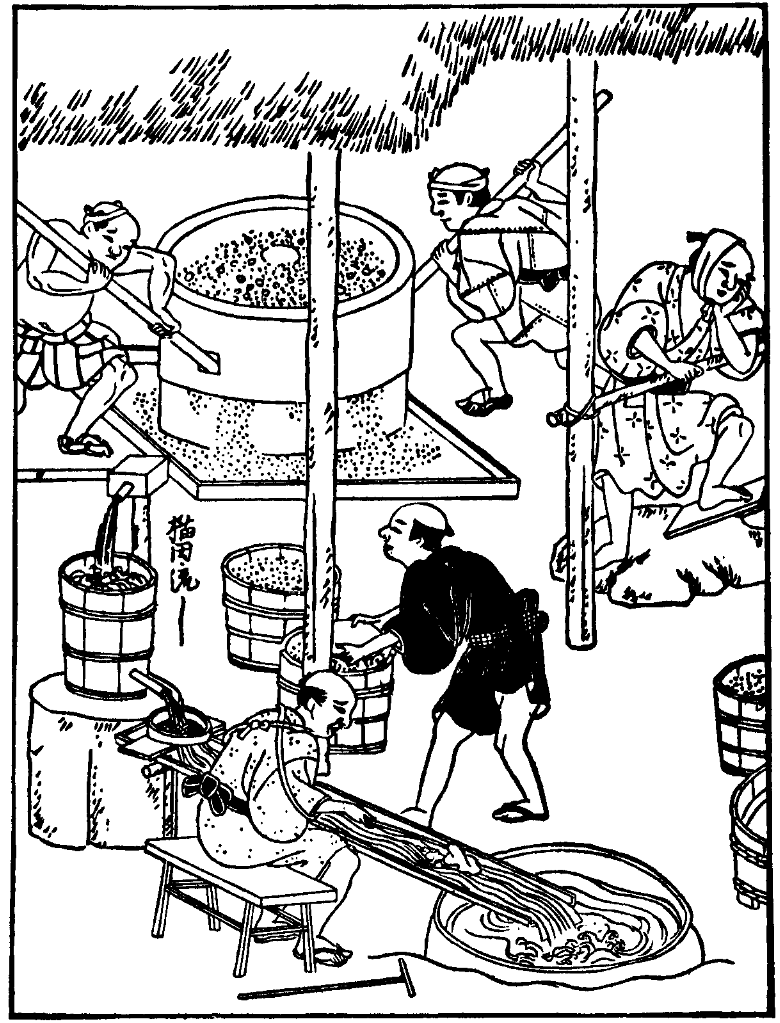


FIG. 2.—GRINDING GOLD ORE IN A QUERN. JAPAN.

THE METALS IN ANTIQUITY.

ROMAN BAS-RELIEF FROM LINARES, SPAIN.

THE METALS IN ANTIQUITY.

embedded in the fire malleable iron would be produced. No mining operations were needed, as the brown ores, which are the easiest to reduce, occur everywhere on the surface and it was these only which were treated by the early iron workers, the others being rejected and are now found in the waste heaps.

From an archaeological point of view, however, there is an anomaly that requires investigation.

If the Achaeans were in the Iron Age, when they entered Greece (1400 to 1300 B.C.), and they obtained their iron from Noricum, or from the ores near Glasinatz, it would seem that the iron weapons of the Hallstatt people of the same culture as those of Glasinatz should be given an earlier date than 700 B.C., which is usually assigned to them, Hallstatt being within easy distance of the prehistoric iron sites of Noricum.

In the Elban district, in the Proto-Etruscan period of Montelius, about 1000 B.C., iron swords with bronze handles are common. From the occurrence of such advanced weapons as swords it might be contended that iron had been in use for several centuries earlier, but this contention will not hold if we remember that the men of the Bronze Age had already become highly skilled as workers in metal, so that, when once they had obtained a lump of iron from its ore, they would have less difficulty in fashioning it into weapons, especially swords, than they had with copper or bronze. Hence, from the first discovery of iron until its general use, there would be no long interval of time.

From what has just been stated regarding these two districts, Noricum and the Elban region, it will be evident that further research is required before we can definitely ascribe to either the first extraction of iron from its ores in Europe.

Then, as regards Asia and Europe, I think there can be no doubt that, as is the case with copper, so with iron, it was in use in Asia before it was known in Europe.

Thrace has been supposed to be the site of early iron smelting, but of this there is no metallurgical evidence. Thracian swords were indeed famous in Homeric times, but it does not follow that, although the swords may have been made in Thrace, that the iron of which they were forged was obtained there, for it is well known that the metal for the noted Damascus blades of mediæval times was not made at Damascus, but at Kona Samundrum near Nirma in Haiderabad,[1] also that Sheffield steel is manufactured from Swedish iron.

[1] Schwarz, *Stahl und Eisen*, vol. xxi, pp. 209–399.

NOTES ON THE ZAGHÁWA AND THE PEOPLE OF GEBEL MÍDÓB, ANGLO-EGYPTIAN SUDAN.

By H. A. MacMichael.

CONTENTS.

Part I.

Introductory.

The Zagháwa are closely related to the Tibbu (or Teda) family, but contain a very considerable leaven of negro blood.[1] Their name is almost certainly derived from the principality of Zaghái, but the terms Zaghái and Zagháwa were both used by Arab writers in a very loose and indefinite manner.

The Zagháwa are mentioned by Idrísi (1154 A.D.) and Ibn Khaldūn (1332–1406) and both counted them as related to the Berbers by race. Mas'ūdi, however, classes them with the Nūba, Beja, "Zing," and "Demádem," under the vague term "Habsha."[2]

In the latter half of the fourteenth century, the Zagháwa were subjugated by the Ḅulála, but little else is known of their history.

By the end of the eighteenth century they had become a vassal state in

[1] Cust classifies them as negroes on linguistic grounds. See *The Modern Languages of Africa*, vol. i, p. 253.

[2] See vol. iii, p. 1, of C. Barbier de Meynard's translation.

northern Dárfūr, and at present they still form a large sedentary population in northern Dárfūr and northern Wadái. At some unknown date, probably early in the eighteenth century, a party of Zagháwa emigrated from Dárfūr to the hills of El Roy'ián, El 'Aṯshán, El Gehanía, and Kagmár in northern Kordofán, and have remained there ever since and have become entirely isolated from the Zagháwa of Dárfūr, speaking no tongue but Arabic, and holding no intercourse with their kinsfolk to the west.

The vocabularies and sentences that follow were collected entirely from young Zagháwa men who came from Dárfūr to Kordofán to work for hire at El Obeid and Bára. From the facility with which many of these youths spoke Arabic and had adopted Arab ways it was evident that the Zagháwa of Dárfūr are rapidly becoming arabicized. In spite of this, they do not like to be called Arabs.

Their only written language was said to be Arabic, and their only religion that of Islam.[1]

VOCABULARY OF DÁRFŪR ẒAGHÁWA.

(*For Explanatory notes vide pp.* 333 *and* 334.)

A.

Above (adv.), tendi; tendi li; bigi ri.
After (prep.), usu; -ra tătŭ (-ra tătŭi); -ré tătŭi; tătŭ ré (tătŭ ri); -ré tătŭ ré. (323)
Afterwards, usū; usūgili; usūti.
Aggrieved, *madlūm. (مظلوم)
Alive, *hai. (حَيّ)
All, soco.
Altogether, socōti.
I am, erri. (316)
Ammunition, *rusás. (رصاص)
Among, derri ri (lit. *in middle of*).
Ancestor, err (arr).
And, ru. (324)
Angry, irra; irri ra (irra ra); *haggalán. (حَجْلاَن)
Another, gé (gié).
Ant (*white*), terri.
Arabic (*the language*), arrăma.
Arabs, arrow.
There are, yi (interrog.: yá).
Arm, tebbir (debbir).
(*Fore*)*arm,* bá debbir.
" (*biceps*), kerrbi.
Armpit, kalli kalli [N.B. cp. word for *a goat* and cp. Latin *hircosus*].
Aunt (*paternal*), anya.
" (*maternal*), *hála. (خالة)
Autumn, tarrba.

B.

Bad, nowi; gurr (gurré).
Back, tūsū (tōsō; toto).

[1] A more detailed account of the Zagháwa will be found incorporated in my book on the tribes of Northern and Central Kordofán, which was published by the Cambridge University Press for the Sudan Government, in October, 1912.

Barks (third pers. sing. verb), wōli.
I bathe, kōra eskeré; *himmi egé. (إستحمّ) (315)
Beads, niungalla.
I bear (*children*), sáagé. (312)
Beard, áti.
Bedayat (*tribe*), Tobá.
Beer (" merissa ") guru.
Before (adv.), árr; árro; ukárr (ukárri); ukárri árr; ukárro (ukwárro); okiá (okiári).
Before (prep.), dalla ré; -ré dalla; -ra dalla (-ra dallai): -ré dalla ro; árra dallai; -ré tăhāi; tăha ré. (323)
Behind, tătŭ (tătŭĭ); tătŭ ré (tătŭ ri).
I bellow, eshīré. (314)
Belly, urr.
Belonging to, kī. (329)
Bird (*small*), tarrbo: (plural, tarrbu).
Black, mmeai.
Blood, aghūi (aghū).
Blue, mmeai.
Book, *kitápi. (كتاب)
Bowl, gátu (gá·u).
Boy, burr.
I break, irrgé. (299)
Breakfast, *futūr; go' (lit. *food*). (فطور)
Bricks, *tin; tungullé. (طين)
I bring, korrgé; kattegé. (304)
Broken, tailé.
Brother (i.e., *fellowman*), kerrbári; *akhu. (أخو)
Brother (*elder*), atá.
Brother (*younger*), kásu.
Brother (*half*; i.e., *mother's son*), amburr.
Bull, bo.
Bullet, *rusás. (رصاص)
I bury (s.c., any object), djigé. (301)
I bury (s.c., a dead person), hégé. (303)
I buy, lágé. (302)

C.

Camel, dí.
I call, gūgé. (299)
I can, tag[h]ágé (tag[h]á egé. (305)
Cat, dimé.
Cheek, kōli; kef. (N.B.—Kef is the side of the face, *i.e.*, nearer the ear than kōli.)
Chest (*human*), iggá.
Chief, kirré.
Chicken, kotti (kutti).
Children, burr.
Circle, gorrogorré.
Clean, kadá.
Clever, *ágil. (عاقل)
Cold, sái.
I collect, sĭsĕgé. (308)
I come, koigé. (311–320)
I complete, *temmi séegé. (تمّ) (330)
Corn (dukhn), baghá.
Corn (dura), kuré.
I cough, kulu egé.
Country, *dár. (دار)
Cow, hirri.
Cowries, algūi.
I create, obtōgé. (311)
Crow (*bird*), gu·á.
Cultivation, tibé.
I cut, gĭgé.
I cut off, timmĕgé.

D.

Dárfūr, korra *dár; *Dárfūr. (دارفور)
Dawn (just before sunrise), uskulla.
Day, kobbái. (Days of the week as in Arabic.)
Dead, li·é (lé); *má·it. (مائت)
Deep, gūsi (gūisi; dūsi; dūisi).
I descend, téegé (téigé) (311–318)
Devil, *shaitán. (شيطان)
I die (*I shall die*), esilé. (313)

I dig, urrugé (o·ūgé) (300)
Dirty, kurrgé.
Do, digé ; *ámili egé. (عمل) (301)
Dog, birri (birrli): (plural bīrri).
Donkey, áddé.
Doorway, bé askar ; *báb. (باب)
Dove (or *pigeon*), ōgu.
Dowry, *mál. (مال)
I drink, yagé (yágé ; yághé). (301)
Drunk, *sakĭrĭ. (سكران)
Dry, ko·á.
Dukhn, baghá.
Dura, kuré.

E.

Ear (*human*), kebbé.
Earth (i.e., *the world*), iddi.
Earth (i.e., *the soil*), errshé.
East, obbi.
I eat, segé (sagé). (301)
Eight, wotté (otté).
Eighteen, *Eighty* } (vide page 297).
Elbow, eskimmi (cp. sub. *heel*).
Elephant, girrbo.
Eleven (vide page 297).
Empty, arroi ; kuai.
Evening, *ŭsŭ ; *īsé. (مساء ; عشيه)
In the evening, *ŭsŭtŭĭ.
Evil, nowi.
Ewe, arro.
Eye, ī.

F.

Face, iddra.
I fall, etteré. (316)
Far, gūa (gūai ; dūai ; dué).
Fat, tagurré.
Father, abba (the same word denotes paternal uncles).
I fear, jŭgé. (307)
Feathers, derri.
I fetch, korrgé ; kattegé. (304)
Fifteen, *Fifty* } (vide page 297).
I fight, ŏkilgé (ŏkĭla ; ŏkĭri). (303)
Fingers, bá burr (bá burré).
Finger (*little*), bá burr (lit. *hand boy*).
Fire, ye'.
Fist, oddu·dum ; mū'. [N.B.—Only one man gave the latter word.]
Five, hūé.
Flail, *dugal. (دقل)
I flee, *hárabi egé. (هرب)
I flog, sai egé.
Food, go'.
Foolish, aggeré.
Foot, dai.
Fourteen, *Forty* } (vide page 297).
Four, ishté.
Fowl, kotti (kutti).
Friend (Ar. أخو), kerrbári.
From, -ré (?). (323)
In front, árré ; tahá ; tahá ré ; tahá dalla.
Full, dégili ; hirri (herri).
Fur (*race*), korra.

G.

Game (*animals*), bádo.
Gazelle, bádo.
Giraffe, orrī.
Girl, tellé.
I give, kégi. (310, 321)
I go, kéegé ; yuegé (and vide sub. *went*), (310, 316, 323).
Goat (or *sheep*), bé-i.
Goat (*male*), kallu-ubu.
God, uddu (iddo).
Gold, *dăhăb. (ذهب)
Good, kadá.

Grandfather (*paternal or maternal*), err (arr).
Grandmother (*paternal or maternal*), ábo.
Grass, e·erné.
Grave (n.), hu.
Grey, duhū.
Grey-headed, kelgi.
Green, girri.
I grip, bigé.
Ground (n.), iddi.
Guinea fowl, gurri (gurrui).

H.

Hair, ŏ·ĕ.
Hatchet (Arab. *fass*), tĕhĕr (tér).
Hand, bá.
I have, tigé. (305)
He, ber.
Head, tăhá (tá).
Head (*of corn*), tánda̧.
Headman, kirré (lit. *Sultan*); okill (*Sheikh*).
I hear, tálogé (tálgé). (306)
Heavy, *tĕgĭlī. (ثقيل)
Heel, eskimmi (vide sub. *elbow*).
Here, kĕgi (kĭgi; kégi; kéki); kékiri (kĕgiri; kĕgi ti; kĭgiri).
I hide (trans.), tīligé.
Himself, erri og[h]o (erri-o).
His, her, og[h]o; ko·o (kog[h]o).
I hit, *dŭrŭbi egé; irregé; saiĕgé. (ضرب) (317–318)
I hoe, tūgé.
Hoe (n.), *debbelé. (دَبَل)
I hold, bigé.
Honey, enné.
Horn, téti (tatti).
Horse, hirrté.
Hot, yé'.
House (*of mud or brick*), *danga. (Sudan Ar: دانجة)
House (*native*), bĕ·a (be').
How, ŭhŭ.
How many, letté; lettétté. (327)
Hundred (vide page 297).
Hut, bĕ·a (be').

I.

I, ai; aiti.
Ill, *mári. (مرضان)
I imprison, *hŭbŭsi egé. (حَبَس)
In, -ri. (318)
Inside, kadderi.
I insult, biágé. (303)
I intend, tahá tigé (tá tigé)—(lit., I have the head . . .)
Is, yi.

K.

I kill, ligé. (298)
Kind (*species*), *gins. (جنس)
Knee, kurru.
Knife, serri.
I know (*knew*), tōgé. (305)

L.

Ladder, *sellim. (سُلَم)
Large, bittī.
I laugh, káli egé. (310)
Lazy, kŭssĭni (kŭssŭnŭ).
Leather, kitti; tádurri.
I leave (i.e., *abandon*), bergé.
I leave (i.e., *quit*), surrgé.
Left (as opposed to right), ummu.
Leopard, oggi (okké).
Leg, dai·i.
Liar, kuwai (kuwé).
I lie down, ĕsĕgĕré. (313)
I lift, kibbi egé (vide sub. *raise*).
I like, gergé; tá tigé (vide sub. *intend*). (303)

Like, dilĕru. (327)
Lion, surra.
Lip, ábirri.
A little, kulli.
Long, gūsi (dūsi; dūisi; gūisi).
For a long time, sagerro.
I lose, asōgiri. (313)
I love, tăké. (306)

M.

Mad (*foolish*), aggeré.
I make, digé; sigé; obtōgé. (301–310)
Man, o (as in English, *boat*); báru (barro).
Many, ubwī; abŭrŭ.
Mare, hirrté da·ai.
Market, *suk. (سُوق)
Marriage, atai.
I marry, dōgé. (302)
Mat, kubbá.
Meat, enni.
I meet, *lági egé; áderi (?). (لقى) (322)
Melon, urru.
Merissa, guru.
Metal, teddi.
Middle, derri.
Milk o (as in English *hot*).
Millet (vide sub. *corn*).
Mine, eggi.
Muhammadan, *Muslim. (مسلم)
Money, *girs. (قرش)
Monkey, ŭttŭrré.
Moon, utté·i (urté·i).
More, abŭrŭ.
Morning, obbi (cp. *east*).
Mother, éa (īa).
Mountain, há (cp. *rock*.)
Mouth, á.
Much, ubwī; abŭrŭ.
My, eggi.

N.

Nail (*human*), targhwi.
Name, ter (tirri).
Navel, oddu.
Near, atū.
Neck (*back of*), enga.
New, obu·i.
Nice, kadá.
Night, gilli.
Last night, gilli·á.
Nine, distī.
Nineteen / *Ninety* } (vide page 297).
No, *la; a'a'; ĭ' ĭ'. (لا)
Noise, *hărăka (hárăga). (حركة)
North, birré (birrii).
Nose, sinna.
Now, *hassa. [(حسة—[حتى الساعة)]

O.

Old (*of persons*), kelgi; mōgu (mō·u).
Old (*of things*), urku·i.
On, tendi li; -ra; -ri. (323)
Once, u lakoi.
One, lakoi.
Open, tegé.
I open, gīgé. (307)
Or (324)
Ostrich, ommŏ.
Other, gé (gié).
Our, gárr (gárro: kárro; árro). (319)
Outside, terri.
Owner, mundár.

P.

Palm (*of hand*), antinné.
People / *Person* } o (as in English *boat*).
Piastre, *girs. (قرش)
Pigeon (*or dove*), ōgu.

Pink, márai.
Pit, agha (agga).
Place (n.), ké.
I play, attorré. (317)
Pocket, *gibbi. (جَيب)
Pond (*or lake*), kay ; *rahad. (رهد)
Poor, *miskīn. (مسكين)
Price, *tămăn. (ثمن)
Prison, *sĭgĭn ; *karakoin. (سجن ; قرة قول [Turkish.])
I put, telgé. (306)

Q.

Be quick, kĭsálo (kĭsáro) ; ayru (only used by Bedayat).
Quickly, kĭsá'.
Quite, socoti.

R.

Rain, bŭttū (būttu).
Rainmaker, hōgi.
Rainy season, gé.
I raise, kibbi egé (imperative sing. kibbilo ; plur. kibbilu).
Ram, turr.
Rascal, mináfo'.
Razor, ku (cp. *spear*).
Red, márai.
I refuse, owiegé. (322–328)
I release, der egé.
Religion, *dīn. (دِين)
Rich, déra.
Ride, orrgé (orregé). (300)
Rifle, *mundūk (bundūk). (بُنْدُوق)
Right (*not left*), iggi.
Has risen (*of the Sun*), kaskŏri (lit. *emerge*). (319)
River, *bahr. (بحر)
Road, garrdi.
Rope, obbo.
Ruler, kirré.
I run, hirrgé. (299)

S.

Salt, teddī.
Sand, siggé.
Sandals, teggé.
I say, īgé. (304)
I see, ĭgé ; loegé. (305, 312, 321)
I seize, bigé. (308)
Self, erri. (320)
I send, kuyegé. (308)
Has set (*of the Sun*), kurūgĭli. (320)
Seven, dishté (dishtī).
Seventeen, *Seventy* } (vide page 297).
Sheep (*or goat*), bé·i.
Sheepskin (*rug*), ow.
Sheikh, okill (okillé).
I shew, bugé ; lágōgé. (302)
Shirt, tári.
Short, tettī.
Shoulder, suggu.
I shout, eshīre ; *háraga egé ; urru egé. (حركة) (314)
I shut, kirrgé. (307)
Shut, tékirri ; kokko.
Side, diré.
I am silent, herregé (harragé). (311)
Silver, *fodda. (فضة)
Sister, kittilá.
Six, deshté.
Sixteen, *Sixty* } (vide page 297).
Skin, tádur ; kitti.
Sky, burrdu.
Slave, immé (immi ; ummé ; ummi).
Slave girl, bĭ.
I sleep, talgé egé. (312)
Slowly, dĭrá'.
Small, minnai (minna).

I smell (*trans.*), *Sĭn egé (shĭn egé). (شمّ)
Smoke, jăjŏ.
I sneeze, hagīs egé. (309)
Soldier, *askari. (عسْكرى)
Someone, li·é (?). (329)
South, *sa'īd. (سعيد)
I sow, bīgé egé.
I speak, oi agé. (301, 322)
Spear, ku.
I spit, ăfi wurgé.
Spotted (*mottled*), hári hári.
I squat, *sundok egé ; *sundok erri. (Sudan Arab, سنجر). (309)
Stalk (*of corn*), koi.
I stand, asowli.
Star, bar : (plural barr).
I start, go egé. (312)
I stay, suégé.
I steal, birrgé ; tilli digé (lit *do thief*) (300, 320)
Stick, bo'.
Stone, há.
I stop, asowli.
I strike, *durubi egé ; sai ĕgé ; irregé. (ضرب) (319)
Strong, kunnu (kunnur) ; *negidt.
I am subject to (*obey*), shīgé ; *tá·i erri.
Sultán, kirré.
Summer, aigé.
Sun, utto.
Sunset, *mikhribé. (مغرب)
Sword, *saif ; *saif serri (lit. *sword knife*.) (سيف)

T.

I take (*with me*), dogé. (302)
Talk, bádī ; ber·ya.
I talk, oiagé. (301)
Tears, ebbi.
Ten, timm (timmi).
That, to ; tŏti. (318)
Theft, tillé (tilli),
Their, kūllūi (kū·i).
There, koto ; kotori (kotora).
They, berr.
Thick, gurri gurri.
Thief, tillé (tilli) ; *harámi. (حَرَامى)
Thigh, daina.
Thin, dūi·i.
Thing, ti.
Thirst, urrga.
Thirteen, *Thirty* } (vide page 297).
This, kī.
Three, wé.
I thresh, kīgé.
Thrice, u wé.
Throat, tá ; urro (lit. *Adam's apple*).
I throw, durgé.
Thumb, bá gurrgo (bá gurrbo).
Tiang, komborré.
Tightly, kunnur (vide sub. *strong*).
Time, *ŭghŭt ; *samán. (*for three times, four times, etc.*, vide *the numerals*). (زمان ; وَقت)
Tired, dūra.
He was tired, dūgili.
To. (322)
Tobacco, táaba.
To-day, kotya ; kobbái.
Toes ; little toe, dai burr (lit. *foot boys ; footboy*).
Toes, big toe, dai gurrgo (dai gurrbo).
Together, ké lakoi (lit. *one place*).
To-morrow, sáli.
Tongue, támsi (támisi).
Tooth, márgi.
Tracks, diyŭgo.
Tree, battī (bittī).
Twelve, *Twenty* } (vide page 297).
Twice, u swé.
Two, swé.

U.

Uncle (paternal), kŏsŏ } "abba" also is applied to either.
Uncle (maternal), máma. }

I understand, tálgé. (306)

Useless, kŭssĭnĭ (kŭssŭnŭ).

It is useless, kékéro.

V.

Valley, ūrré (used like the Arabic "wadi" in a wide sense).

Very, soco (lit. *all*).

Village, gelli.

W.

I walk, kéegé; yuegé. (310)

I want, gergé; tá tigé (vide *wish*) (303, 329)

Water, bī.

We, to; toi; toi ti.

Weak, kásini; *da' īf. (ضعيف)

I weep, ebbi eshīré (lit. *shout tears*).

Well (n.), bá.

Well (adv.), kadá.

He went, tī } (and vide sub. *go*).
They went, á; álu }

West, osko.

What? lua; luai; lé. (327)

When? léri. (327)

Where? lŏr; lōri; lōgĭli; lōgĭri; lŏghŏri; lŏghĭri; lōˑiri. (327)

Which? lai (pronounced with a drawl). (326)

White, terri.

Who, lai (with a drawl). (326)

Why, lua ré; lua *shannu. (شان) (326)

Whole, soco.

Winter, dábo.

Wish; wish for, tá tigé (lit. *have the head*).

With. (324)

Woman, bágu (báˑu).

Wood, uddu.

Wool, ŏˑĕ (cp. *hair*).

I work * { hidimi eskeré. (خدمه) (315)
(hirimi) „ }

Work (n.), *hidimi (hirimi); *shaghlé; ké. (شغل)

World, iddi.

I wound, tĭbĭgé.

Wounded, tūs.

Wrist, bá karriá.

Wrong, kobboi.

Y.

Ye, lo.

Year, gé (lit. *rainy season*); ebé.

Last year (n.), aiga (éga).

Last year (adverbially), aigia (égia) aigia ré.

Yellow, birri (billi); girri (gerri).

Yes, nn; mm; *aiwa. (ايوا)

Yesterday, berˑya.

The day before yesterday, kūra.

The day before yesterday evening, kūra twī. [N.B.—We, reckoning the night to follow the day, should call this *three days ago*.]

You, *la. (لا)

Your, kollo (gollo): (plural, kollui).

Z.

Zagháwa (race), Berri; *Sakáwa. (زغاوى). (N.B.—The Zagháwa call themselves Berri and say the Arabs call them Sakáwa.)

Numerals.

1. lakoi.	*once*, u lakoi.
2. swé (shwé).	*twice*, u swé.
3. wé.	*thrice*, u wé.
4. ishté.	etc.
5. hūé.	
6. deshté.	
7. dishté (dishtī).	
8. wotté (otté).	
9. distī (dishtī).	
10. timm (timmi).	

(The use of ordinal numbers is not understood.)

In using the above numerals in sentences, an affix -ti is often added, *e.g.*, lakotti (for lakoi ti); shitti (for shwé ti); wéti, etc.

There is no word for any of the numerals onwards from ten; but after reaching ten the Zagháwa say for

eleven, gé lakoi (*i.e.*, *another one*).
twelve, gé swé (*i.e.*, *another two*).
twenty, gé timm (*i.e.*, *another ten*), etc.

Or, another way of saying

twenty is timm swé.
thirty is timm wé.
forty is timm ishté, etc.

There is no word for 100; but the Arabic "mīa" is used occasionally.

Colours.

The following words are not merely translations of Arabic words, but were obtained by displaying an object and asking what colour it was.

From sky blue to indigo (*i.e.*, the English *blue*) *and black* ...	mmeai.
From pink to crimson (*i.e.*, the English *red*)	márai.
White	terri.
Bright green	girri.
Dirty white, light brown, light greenish, and light yellowish ...	birrī.
Grey	duhū.
Bright yellow	*by some*: girri. *by others*: birrī.

Notes on the Conjugation of Verbs.

1. I have as far as possible placed the verbs into groups, adding footnotes at intervals.

2. It will be noticed that the past tense of the more regular form of verbs differs from the present very slightly (except in the 3rd persons). I found it hard to locate the exact difference in pronunciation, though it was insisted upon by the Zagháwa. I have as a general rule used -é as the affix of the present, and -i of the past as I think to be correct after listening very carefully when the Zagháwa tried to explain the difference.

3. As regards the 1st person plural, the pronoun was generally pronounced as "toi," but others pronounced it "to." I have used "to" throughout for the sake of consistency.

4. Between the pronoun and the verb, more noticeably in the 1st person singular and the 3rd persons singular and plural, there was often inserted -gu, or, as others called it in all but the 3rd person, -u;—thus "ai u talgé," or "ai gu talgé," or else simply "ai talgé"—(apparently indiscriminately; and again "ber hirré" or "ber gu hirré" (but never "ber u hirré")—also indiscriminately. As this -gu or -u was used with both transitive and intransitive verbs and was said to make no difference in meaning, and was inserted or omitted haphazard (and I could not discern any difference in meaning), I conclude that it is only used for the sake of euphony, and, in the conjugation of the verbs, omit it. It appears, however, in the sentences, later, as it was given.

5. It will be seen on reading the longer sentences on pages 330 to 333 that in some cases the parts of the verbs there occurring vary from the corresponding forms as given to me in the conjugations of the verbs. I have left such discrepancies untouched. The Vocabulary furnishes the necessary cross references.

Conjugation of Verbs.

To kill.

Imperative (singular), li.
„ (plural), liu.

Singular.	1. ai ligé (*I kill*).	ai ligi (*I killed*).
	2. la lilé.	la lili.
	3. ber liré.	ber kili.
Plural.	1. to lidé.	to lidi.
	2. lo libé.	lo libi.
	3. berr liré.	berr kilu.

Note 1.—*I am killed,* ai ekilié erri; ai ekili egé erri.

Note 2.—*Cp.* ai ĕsĭlé (*I shall die*), which has the same stem as this verb.

To run.

Imperative (singular), hirri : negative, hirrlŏghŏ.
„ (plural), hirru : „ hirrbŏghŏ.

Singular.	1. ai hirrgé (*I run*).	ai hirrgi (*I ran*).
	2. la hirrlé.	la hirrli.
	3. ber hirré.	ber kihirri ; kihirrii.
Plural.	1. to hirrdé.	to hirrdi.
	2. lo hirrbé.	lo hirrbi.
	3. berr hirré.	berr kihirru.

To call.

Imperative (singular), gu.
„ (plural), gū.

Singular.	1. ai gūgé (*I call*).	ai gūgi.
	2. la gūlé.	la gūli.
	3. ber gūré.	ber kūguri.
Plural.	1. to gūdé.	to gūdi.
	2. lo gūbé.	lo gūbi.
	3. berr gūré.	berr kūguru.

To break.

Imperative (singular), irri : negative, irrlŏghŏ.
„ (plural), irru : „ irrbŏghŏ.

Singular.	1. ai irrgé (*I break*).	ai irrgi (*I broke*).
	2. la irrlé.	la irrli.
	3. ber irré.	ber kirri.
Plural.	1. to irrdé.	to irrdi.
	2. lo irrbé.	lo irrbi.
	3. berr irré.	berr kirru.

Note.—I have broken it, ai irrgi tigi.

To ride.

Imperative (singular), orré (orri).
„ (plural), orru (orriu).

Singular.	1.	ai orrgé (*I ride*).	ai orrgi (*I rode*).
	2.	la orrlé (ollé).	la orrli.
	3.	ber orré.	ber korri.
Plural.	1.	to orrdé.	to orrdi.
	*2.	lo orrbé.	lo orrbi.
	3.	berr orré.	berr kurru.

* *Note* 1.—For the 2nd person plural of the present tense "lo orriu" and "lo orru" were actually said, and not "lo orrbé," but the speakers obviously dropped inadvertently into the imperative, since in the past we have "lo orrbi."

Note 2.—*I am about to ride,* ai orrgé egé.
I was riding a horse, ai hirrté orrgi erri.
you were riding a horse, la hirrté orrli lerri.
he was riding a horse, ber hirrté korrié yi.
I am riding, ai orrgé erri.

To dig.

Imperative (singular), urru: negative, urrlŏghŏ.
„ (plural), urrū: „ urrbŏghŏ.

Singular.	1.	ai urrŭgé (*I dig*).	ai urrŭgi (*I dug*).
	2.	la urrŭlé.	la urrŭli.
	3.	ber urré.	ber kurrui.
Plural.	1.	to urrŭdé.	to urrŭdi.
	2.	lo urrŭbé.	lo urrŭbi.
	3.	berr urré.	berr kūrrū.

To steal.

Imperative (singular), birr.
„ (plural), birru.

Singular.	1.	ai birrgé (*I steal*).	ai birrgi (*I stole*).
	2.	la birrlé.	la birrli.
	3.	ber birré.	ber kibirri.
Plural.	1.	to birrdé.	to birrdi
	2.	lo birrbé.	lo birrbi.
	3.	berr birré.	berr kibirru.

Note.—*I am about to steal,* ai birrgé egé.
It is stolen, tĕbirré yi.
he had stolen it, kibirré yi.

To speak.

Imperative (singular), oia: negative, oiălŏghŏ.
„ (plural), oiau: „ oiăbŏghŏ.

Singular.	1.	ai oiăgé (*I speak*).	ai oiăgi; ai oi aigi (*I spoke*).
	2.	la oiălé.	la oiăli.
	3.	ber oiăré.	ber koiai.
Plural.	1.	to oiădé.	to oiădi.
	2.	lo oiăbé.	lo oiăbi.
	3.	berr oiăré.	berr koiălu.

To eat.

Imperative (singular), se (sé·i, si).
„ (plural), seo (sio).

Singular.	1.	ai segé (*I eat*).	ai segi (*I ate*).
	2.	la selé.	la seli.
	3.	ber seré.	ber kiseri.
Plural.	1.	to sedé.	to sedi.
	2.	lo sebé.	lo sebi.
	3.	berr seré.	berr kiseru.

To make; do.

Imperative (singular), dĭ: negative, dĭlŏghŏ.
„ (plural), dĭu: „ dĭbŏghŏ.

Singular.	1.	ai digé (*I make, etc.*).	ai digi (*I made, etc.*).
	2.	la dilé.	la dili.
	3.	ber diré.	ber kidiri (kidili).
Plural.	1.	to didé.	to didi.
	2.	lo bibé.	lo dibi.
	3.	berr diré.	berr kidiru (kidilu).

Note.—Ai djigé (*I bury* [an object]) is declined throughout in the same manner.

To drink.

Imperative (singular), ya: negative, yalŏghŏ.
„ (plural), ya·u „ ya bŏghŏ.

Singular.	1.	ai yagé (*I drink*).	ai yagi.
	2.	la yalé.	la yali.
	3.	ber yaré.	ber kĭyari.
Plural.	1.	to yadé.	to yadi.
	2.	lo yabé.	lo yabi.
	3.	berr yaré.	berr kĭyaru.

To show.

Imperative (singular), ábo: negative, ábo lŏghŏ.
„ (plural), áabo: „ ábo bŏghŏ.

Singular.	1. ai bugé (*I show*).	ai bugi (*I showed*).
	2. la bulé.	la buli.
	3. ber buré.	ber kűbui.
Plural.	1. to budé.	to budi.
	2. lo bubé.	lo budi.
	3. berr buré.	berr kűbulu.

To take (with one).

Imperative (singular), do: negative, do lŏghŏ.
„ (plural), do·o: „ do bŏghŏ.

Singular.	1. ai dogé (*I take, etc.*).	ai dogi (*I took, etc.*).
	2. la dolé.	la doli.
	3. ber doré.	ber kodoli (kodolé).
Plural.	1. to dodé.	to dodi.
	2. lo dobé.	lo dobi.
	3. berr doré.	berr kudulū.

Note 1.—Here (in the 3rd person plural of the past) is a good example of the general tendency to deepen the sound in the plural.

Note 2.—The word for "I marry" (of the man) is dōgé, and is conjugated in exactly the same way: the two words dogé and dōgé were said to differ in the sound of the *o*; but one would suppose they were one and the same word.

To buy.

Imperative (singular), lá: negative, lá lŏghŏ.
„ (plural), lá·u: „ lá bŏghŏ.

Singular.	1. ai lágé (*I buy*).	ai lági (*I bought*).
	2. la lálé.	la láli.
	3. ber láré.	ber kilá·i.
Plural.	1. to ládé.	to ládi.
	2. lo lábé.	lo lábi.
	3. berr láré.	berr kilálu.

Note.—I have bought (it) = ai lági tigi.

To insult.

Singular.	1. ai biágé (*I insult*).	ai biági (*I insulted*).
	2. la biálé.	la biáli.
	3. ber biáré.	ber kibiai (kibiá).
Plural.	1. to biádé.	to biádi.
	2. lo biábé.	lo biábi.
	3. berr biáré.	berr kibiáru.

I want; like.

Singular.	1. ai gergé (*I want, etc.*).	ai gergi (*I wanted, etc.*).
	2. la gerlé.	la gerli.
	3. ber gerré.	ber kigerri.
Plural.	1. to gerdé.	to gerdi.
	2. lo gerbé.	lo gerbi.
	3. berr gerré.	berr kigerru.

To bury (a man).

Imperative (singular), héo.
„ (plural), héu.

Singular.	1. ai hégé (*I bury*).	ai hégi (*I buried*).
	2. la hélé.	la héli.
	3. ber héré.	ber kihé·i.
Plural.	1. to hédé.	to hédi.
	2. lo hébé.	lo hébi.
	3. berr héré.	berr kihéru.

To fight.

Imperative (singular), ŏki : negative, ŏki lŏghŏ.
„ (plural), ŏku : „ ŏki bŏghŏ.

Singular.	1. ai ŏkílgé (*I fight*).	ai ŏkílgi (*I fought*).
	2. la ŏ̃kilé.	la ŏ̃kili.
	3. ber ŏ̃kiré.	ber kŏki.
Plural.	1. to ŏ̃kidé.	to ŏ̃kidi.
	2. lo ŏ̃kibé.	lo ŏ̃kibi.
	3. berr ŏ̃kiré.	berr kŏ̃kilu.

Note 1.—The singular of the present was by another man given as ai ŏ̃kila, la ŏ̃kila, ber ŏ̃kira : and by a third as ai ŏ̃kiri, la ŏ̃kili, ber ŏ̃kiri.

Note 2.—I am about to fight = ai ŏkigi egé. [There must therefore be a form ai ŏkigé (*I fight*).]

Note 3.—When the accent in pronunciation of the 1st person singular present falls on the propenultimate syllable, then, if egé be added, the last syllable is softened from é to i: *e.g.*, ŏkigi egé instead of ŏkigé egé. Cp. note to téegé.

To bring.

Imperative (singular), korro (karro).
" (plural), karru.

Singular.	1. ai korrgé (*I bring*).	ai korrgi (*I brought*).
	2. la korrlé.	la korrli.
	3. ber korré.	ber kodoli (kodolé).
Plural.	1. to korrdé.	to korrdi.
	2. lo korrbé.	lo korrbi.
	3. berr korré.	berr kudulū.

Note 1.—The third persons of the past tense are borrowed from dogé (q.v.).
Note 2.—*I have brought* (*it*), ai korrgi tigi.

To fetch or bring.

Singular.	1. ai kattegé (*I fetch*).	ai kattegi (*I fetched*).
	2. la kattelé.	la katteli.
	3. ber katteré.	ber katté·i.
Plural.	1. to kattedé.	to kattedi.
	2. lo kattebé.	lo kattebi.
	3. berr katteré.	berr kattélu.

Note.—I could find no imperative for this verb.

Note.—The following two verbs are regular in the present and almost indistinguishable in pronunciation: they differ however in the past.

To say.

Singular.	1. ai igé (*I say*).	ai igi (*I said*).
	2. la ilé.	la ili.
	3. ber iré.	ber kī.
Plural.	1. to idé.	to idi.
	2. lo ibé.	lo ibi.
	3. berr iré.	berr kīlū.

To see.

Singular.	1. ai ĭgé (*I see*).	ai aigi (*I saw*).
	2. la ĭlé.	la aili.
	3. ber ĭré.	ber ághi (ághii).
Plural.	1. to ĭdé.	to aidi.
	2. lo ĭbé.	lo aibi.
	3. barr ĭré.	berr ágilu.

Note.—The four following verbs have the appearance of past tenses (*vide* the third persons). I could only find a single tense in use.

To have.

Singular.	1. ai tigé (tigi) (*I have* or *I had*).
	2. la tilé (tili).
	3. ber kité (kiti).
Plural.	1. to tidé (tidi).
	2. lo tibé (tibi).
	3. berr kité (kiti).

Note.—This verb, like the English "have," is also used as an auxiliary. Examples have been given.

To know.

Singular.	1. ai tōgé (*I know or I knew*).
	2. la tōlé (tulé).
	3. ber kutŭĭ.
Plural.	1. to tōdé (tudé).
	2. lo tōbé (tubé).
	3. berr kutŭru (kutŭlu).

To be able.

Singular.	1. ai tag[h]ágé (tag[h]ági) (*I can or I could*).
	2. la tag[h]álé (tag[h]áli).
	3. ber kitáré; kitágiri (kitágiré; kitágári).
Plural.	1. to tag[h]ádé (tag[h]ádi).
	2. lo tag[h]ábé (tag[h]abi).
	3. berr kitágiru.

Note.—For "ai tag[h]ágé" there may be used "ai tag[h]á egé."

To love.

Singular.	1. ai také (*I love* or *loved*).	Plural.	1. to tágidi.
	2. la tágili.		2. lo tágibi.
	3. ber kitágiri.		3. berr kitágiru.

Note.—The third persons appear the same as those of ai tag[h]ágé.

Note.—In the following three verbs the usual *r* in the third persons gives place by assimilation to an *l*. In jŭgé, however, an *r* is also possible.

To put.

Imperative (singular), tel : negative, tel lŏghŏ.
„ (plural), tal; togo : negative, tel bŏghŏ.

Singular.	1. ai telgé (*I put*).	ai telgi (*I put* [*past*]).
	2. la tellé.	la telli.
	3. ber tellé.	ber kitelli.
Plural.	1. to teldé.	to teldi.
	2. lo telbé.	lo telbi.
	3. berr tellé.	berr kitellu ; or, togoyáru

Note 1.—The forms togo and togoyáru would seem to belong to a different stem altogether.

Note 2.—*It is placed*, tihaié yi.

To hear.

Imperative (singular), tălo, tálo : negative, tálŏghŏ.
„ (plural), tălu, tálu : „ tálbŏghŏ.

Singular.	1. ai talgé; tálogé (*I hear*).	ai talgi (*I heard*).
	2. la tallé ; tálolé.	la talli.
	3. ber tallé ; tálé.	ber kitalli ; kitálo·i
Plural.	1. to talde.	to taldi.
	2. lo talbé.	lo talbi.
	3. berr tallé; tálé.	berr kitallu · kitálu

To fear.

Imperative (singular), ju.
„ (plural), jū.

Singular.	1. ai jŭgé (*I fear*).	ai jŭgi (*I feared*).
	2. la jŭlé.	la jŭli.
	3. ber jŭlé (jŭré).	ber kŭjŭri.
Plural.	1. to jŭdé.	to jŭdi.
	2. lo jŭbé.	to jŭbi.
	3. berr jŭlé (jŭré).	berr kujŭru.

Note.—The verbs that follow are conjugated like those preceding in the present tense, but the third persons of the past tense are of a different form.

To open.

Imperative (singular), gi: negative, gi lŏghŏ.
„ (plural), giu: „ gi bŏghŏ.

Singular.	1. ai gīgé (*I open*).	ai gīgi (*I opened*).
	2. la gīlé.	la gīli.
	3. ber gīré.	ber giáré.
Plural.	1. to gīde.	to gīdi.
	2. lo gībé.	lo gībi.
	3. berr gīré.	berr giáru.

Note.—The door is opened, *báb tégiri yi; *báb tegé yi.

To shut.

Imperative (singular), kirri.
„ (plural), kirru.

Singular.	1. ai kirrgé (*I shut*).	ai kirrgi (*I shut* [*past*]).
	2. la kirrlé.	la kirrli.
	3. bir kirré.	ber kirriári.
Plural.	1. to kirrdé.	to kirrdi.
	2. lo kirrbé.	lo kirrbi.
	3. berr kirré.	berr kirriáru.

Note.—The door is shut, *bab tékirri yi.

To send.

Imperative (singular), kuyi: negative, kuyi lŏghŏ.
„ (plural), kuu: „ kuyi bŏghŏ.

Singular.	1.	ai kuyegé (*I send*).	ai kuyegi (*I sent*).
	2.	la kuyelé.	la kuyeli.
	3.	ber kuyeré.	ber kuyári.
Plural.	1.	to kuyedé.	to kuyedi.
	2.	lo kuyebé.	lo kuyebi.
	3.	berr kuyeré.	berr kuyáru.

Note.—I am sent, akuyári erri.

To collect (trans.).

Imperative (singular), sĭsĭ.
„ (plural), sĭsŭ.

Singular.	1.	ai sĭsĕgé (*I collect*).	ai sĭsĕgi (*I collected*).
	2.	la sĭsĕlé.	la sĭsĕli.
	3.	ber sĭsĕré.	ber sisiáré.
Plural.	1.	to sĭsĕdé.	to sĭsĕdi.
	2.	lo sĭsĕbé.	lo sĭsĕbi.
	3.	berr sĭsĕré.	berr sĭsiáru.

To seize.

Imperative (singular), bĭ: negative, bĭ lŏghŏ.
„ (plural), biu: „ bĭ bŏghŏ.

Singular.	1.	ai bigé (*I seize*).	ai bigi (*I seized*).
	2.	la bilé.	la bili.
	3.	ber biré.	ber biáré.
Plural.	1.	to bidé.	to bidi.
	2.	lo bibé.	lo bibi.
	3.	berr biré.	berr biáru.

Note.—I am seized, ai ebiári erri.
you are „ la lebiári lerri.
he is „ ber biáré yi; ber tebié yi.
we are „ to tebiári terri.
ye are „ lo lebiári lerri.
they are „ berr biáré yi.
I am about to seize, ai bigé egé.
I am seizing, ai bigé erri.

Note.—The mark of the following verbs is that they have an imperative in -lo: the third persons of the past tense, also, end in -gili (-kili) and -gilu (-kilu). The stem remains unchanged throughout and [e]gé, [e]lé, lé, etc., are added in the different persons. This form is used especially in conjugating verbs formed from the Arabic, *e.g.*, *"sundok egé," *"dŭrŭbi egé," *"hárabi egé," etc., and would seem, if strictly interpreted, to have a future signification. Note that from the ordinary verbs given above, *e g.*, "birrgé" (*I steal*), "bigé" (*I seize*), etc., a tense "birrgé egé," "bigé egé," etc., can be formed, meaning, *I am about to steal, I am about to seize, etc.* Thus whereas one can say either "bigé" (*I seize*), or "bigé egé" (*I am about to seize*), or "bigé erri" (*I am seizing*), only two forms of the following verbs are used, viz., *e.g.*, "sundok egé" (*I squat, or, I am about to squat*), and "sundokerri" (*I am squatting*), etc. That "sundok egé" etc., have not only a future meaning, but a present one as well is, I think, shown by the fact that there is a past tense of the form, viz., "sundok egi," etc., meaning, *I squatted.*

To squat.

Imperative (singular), *sundoklo: negative, *sundok ĕlŏghŏ.
„ (plural), *sundoklu: „ *sundok ĕbŏghŏ.

Singular.	1. ai *sundokegé (*I shall squat* or *I squat*).	ai *sundokegi (*I squatted*).
	2. la *sundokelé.	la *sundokeli.
	3. ber *sundoklé.	ber *sundokkili.
Plural.	1. to *sundokedé†.	to *sundokedi.
	2. lo *sundokebé.	lo *sundokebi.
	3. berr *sundoklé.	berr *sundokkilu.

†*Note* 1.—Another gave the 1st person plural as "sundokderé," *vide* note on "hagīs edé," below.

Note 2.—*I am squatting*, ai sundokerri.

To sneeze.

Imperative (singular), hagīs lo: negative, hagīs ĕlŏghŏ.
„ (plural), hagīs lu: „ hagīs ĕbŏghō.

Singular.	1. ai hagīs egé (*I shall sneeze* or *I sneeze.*)	ai hagīs egi (*I sneezed*).
	2. la hagīs elé.	la hagīs eli.
	3. ber hagīs lé.	ber hagīs kili.
Plural.	1. to hagīs edé.†	to hagīs edi.
	2. lo hagīs ebé.	lo hagīs ebi.
	3. berr hagīs lé.	berr hagīs kilu.

†*Note.*—Another gave the 1st person plural as "hagīs deré": this may represent "hagīs terri," *i.e.*, we are sneezing, "terri" being the auxiliary. d and t are pronounced almost alike.

To laugh.

Imperative (singular), káli lo: negative, káli ĕlŏghŏ.
" (plural), káli lu: " káli ĕbŏghŏ.

Singular.	1. ai káli egé (*I shall laugh* or *I laugh*).	ai káli egi.
	2. la káli elé.	la káli eli.
	3. ber káli lé.	ber káli kili.
Plural.	1. to káli edé.	to káli edi.
	2. lo káli ebé.	lo káli ebi.
	3. berr káli lé.	berr káli kilu.

Note.—The following verbs from their method of conjugation appear similar to those immediately preceding them; but since in their case the auxiliary "-egé" has not been compounded with a separately entire word (such as "Sundok," etc.) the two parts of them, viz., "-egé" and the stem, have more closely amalgamated and become a single simple verb in appearance, with a present or only faintly future meaning: to such an extent has this amalgamation occurred that we find such forms as "téegi egé" (*I am about to descend*), kéegi egé (*I am about to go*), etc.

To go, or walk.

Imperative (singular), kélo (kello): negative, kélŏghŏ.
" (plural), kélu: " kébŏghŏ.

Singular.	1. ai kéegé (*I go*).	ai kéegi (*I went*).
	2. la kéelé.	la kéeli.
	3. ber kélé.	ber kégili (kéegili).
Plural.	1. to kédé.	to kédi.
	2. lo kébé.	lo kébi.
	3. berr kélé.	berr kégilu.

Note.—The verb "kegi" which follows, appears almost identical in conjugation except in the imperative; but it is pronounced less broadly and with slighter emphasis on both syllables.

To give.

Imperative (singular), ké (ké·i).
" (plural), ké·u.

Singular.	1. ai kégi (*I give*).	ai kégi (*I gave*).
	2. la kéli.	la kéli.
	3. ber kéli.	ber kégili.
Plural.	1. to kédi.	to kédi.
	2. lo kébi.	lo kébi.
	3. berr kéli.	berr kégilu.

Note.—I could distinguish no difference between the two tenses except in the

third persons. From the examples of the use of "kégi" in sentence (q.v.) it seems to be irregular, but it is inserted here because of its similarity to "kéegé."

To be silent.

Imperative (singular), herrlo : negative, herr ĕlŏghŏ.
" (plural), herrlu : " herr ĕbŏghŏ.

Singular.	1. ai herregé (*I am silent*).	ai herregi (*I was silent*).
	2. la herrelé.	la herreli.
	3. ber herrlé.	ber herrgili.
Plural.	1. to herredé.	to herredi.
	2. lo herrebé.	lo herrebi.
	3. berr herrlé.	berr herrgilu.

To make, or create.

Imperative (singular), negative, oto ĕlŏghŏ.
" (plural), " oto ĕbŏghŏ.

Singular.	1. ai obtōgé (*I make*).	ai obtōgi (*I made*).
	2. la obtōlé.	la obtōli.
	3. ber obtōlé.	ber obtōgili.
Plural.	1. to obtōdé.	to obtōdi.
	2. lo obtōbé.	lo obtōbi.
	3. berr obtōlé.	berr obtōgilu.

To descend.

Imperative (singular), télo : negative, té ĕlŏghŏ.
" (plural), télu : " té ĕbŏghŏ.

Singular.	1. ai téegé (*I descend*).	ai téegi (*I descended*).
	2. la téelé.	la téeli.
	3. ber télé.	ber tégili.
Plural.	1. ta téedé.	to téedi.
	2. lo téebé.	lo téebi.
	3. berr télé.	berr tégilu.

Note.—I am about to descend, ai téegi egé (*cp.* notes 2 and 3 "to okilgé").

To start.

Imperative (singular), golo (gŭlŭ): negative, gŭ ĕlŏghŏ.
" (plural), gulu: " gŭ ĕbŏghŏ.

Singular.	1. ai goegé (*I start*).	ai goegi (*I started*).
	2. la goelé.	la goeli.
	3. ber goilé.	ber goigili (goégili).
Plural.	1. to goedé.	to goedi.
	2. lo goebé.	lo goebi.
	3. berr guilé.	berr guigilu.

Note.—Notice the faint shade of difference in pronunciation between the 2nd and 3rd persons singular of the present, and the deepening of the sound in the 3rd persons plural.

To bear (children).

Singular.	1. ai sáagé (*I bear*).	ai sáagi (*I bore*).
	2. la sáalé.	la sáali.
	3. ber sálé.	ber ságili.
Plural.	1. to sáadé.	to sáadi.
	2. lo sáabé.	lo sáabi.
	3. berr sálé.	berr ságilu.

To sleep.

Singular.	1. ai talgḗégé (*I sleep*).	ai talgḗégi (*I slept*).
	2. la talgḗélé.	la talgḗéli.
	3. ber talgélé (talgilé).	ber talgégili.
Plural.	1. to talgḗédé.	to talgḗédi.
	2. lo talgḗébé.	lo talgḗébi.
	3. berr talgélé (talgilé).	berr talgégilu.

Note.—I am sleeping, ai talgégi erri.

To see.

Imperative (singular), lŏlŏ: negative, lo ĕlŏghŏ.
" (plural), lōlū: " lo ĕbŏghŏ.

Singular.	1. ai loegé (*I see*).	ai loegi (*I saw*).
	2. la loelé.	la loeli.
	3. ber lolé.	ber logili.
Plural.	1. to loedé.	to loedi.
	2. lo loebé.	lo loebi.
	3. berr lolé.	berr logilu.

Note.—The difference in meaning between ai igé (q.v.) and ai loegé seems to be very small. The former is often used for "I find" as well as "I see."

Note.—The form of the following verbs varies considerably from that of the previous ones. The stem in the first tense given in each case remains unchanged throughout, and a pronominal prefix is put before it. This prefix seems to bear a future meaning.[1] The past tense is quite distinct, though the same stem is traceable in it. The imperative begins with l.

To lie down.

Imperative (singular), legé: negative, legé ĕghŏ.
„ (plural), legu: „ legé lu.

Singular.	1. ai ĕ̄sĕgĕré (*I shall lie down*, or *I lie down*).	ai ĕgé (*I lay down*).
	2. la lĕ̄sĕgĕré.	la lĕgé.
	3. ber sĕ̄gĕré.	ber gé.
Plural.	1. to tĕ̄sĕgĕré.	to tĕgé.
	2. lo lĕ̄sĕgĕré.	lo lĕgélu.
	3. berr sĕ̄gĕré.	berr gélu.

Note 1.—The stem is apparently gé. The word is connected, I think, with talgéegé (*I sleep*) q.v.

Note 2.—*I was lying down*, ai egié erri.
I am „ „ ai egéri (ai egé erri).
I am about to lie down, ai ĕ̄sĕgĕré egé.

To lose.

Singular.	1. ai asōgiri (*I shall lose*, or *I lose*).	ai akuori (*I lost*).
	2. la lasōgiri	la lakuori.
	3. ber sōgiri.	ber kūri.
Plural.	1. to tasōgiri.	to takuori.
	2. lo lasōgiri.	lo lakuoru.
	3. berr sōgiri.	berr kūrū.

Note.—Here the past tense is evidently from a different stem.

To die.

Imperative (singular), leli (li ĕli): negative, leli ĕghŏ.
„ (plural), lálu: „ lálu lughu.

Singular.	*Alternative form.*	
1. ai ĕ̄sĭlé (ai ĕsĭ leli), *I shall die.*		ai eli (elii), (*I died*).
2. la lĕ̄sĭlé (la lĕsĭ leli).		la leli.
3. ber silé (sili) (ber sĭ leli).		ber li (lii).
Plural.		
1. to tŏ̄sŏlé	(to tŏsŏ leli).	to táloi.
2. lo lŏ̄sŏlé	(lo lŏsŏ leli).	lo lelu.
3. berr sulé	(berr su leli).	berr lulu.

[1] *Vide* note on ai ĕ̄sĭlé.

Note.—The following were the examples given, and show the difference in meaning between the various tenses of this verb.

I shall die (lit., *I shall be dead ?*), ai ĕsĭlé.
I shall die (lit., *I shall be dying ?*), ai ĕsĭ leli.
I am about to die, ai ĕsĭlĭ egé.
he is dying, ber si leli.
he will die, ber sili.
he died, ber lii.
he is dead, ber li·é (ber lé) ; *or,* ber li·é yi.
I am dead, ai eli erri.
you are dead, la leli lerri ; la lelié lerri.
we are dead, to tálo terri.
he has not died, na li·o.

To stand.

Imperative (singular), lŏw : negative, low lŏghŏ.
„ (plural), láū : „ láū lughu.

Singular.	1. ai asowli (*I shall stand* or *I stand*).	ai owli (*I stood*).
	2. la lasowli.	la lowri.
	3. ber sowli.	ber owli.
Plural.	1. to tosowli.	to towli.
	2. lo losowli.	lo lowri.
	3. berr sowli.	berr owli.

Note 1.—Note the substitution of *r* for *l* (lowri for lowli) by euphonism in the second persons of the past tense.

Note 2.—*I am standing,* ai owli erri.

To shout or *roar.*

Imperative (singular), leyi : negative, leyi ĕrŏghŏ.
„ (plural), leyu : „ leyi erughu.

Singular.	1. ai eshīré (*I shall shout* or *I shout.*)	ai eyiri (*I shouted*).
	2. la leshīré.	la leyiri.
	3. ber shīré.	ber eyiri.
Plural.	1. to teshīré.	to teyiri.
	2. lo leshīré.	lo leyiru.
	3. berr shīré.	berr eyiru.

Note 1.—The stem is apparently "ey" ; and "eshīré" may stand for "eseyiré.

Note 2.—Probably "leyi ĕlŏghŏ," "elughu" should be written for the negative form of the imperatives.

Note 3.—I shouted before, "ai árro eyiri."

To work.

Imperative (singular), *hidimi leski : negative, *hidimi leskĭ ĕghŏ.
„ (plural), *hidimi lesku : „ *hidimi leskĭ lughu.

Singular.	1. ai *hidimi eskĕré (*I shall work* or *I work*).	ai *hidimi eski (eskii), (*I worked*).
	2. la *hidimi leskĕré.	la „ leski.
	3. ber „ tĕsĕré ; tĕhĭré.	ber „ tĕsi ; tehii.
Plural.	1. to „ teskeré.	to „ teski (teskii).
	2. lo „ leskĕré.	lo „ leskĭlu (leskĭru).
	3. berr „ tĕsĕré ; tĕhĭré.	berr „ tĕsĭru ; tĕhĭru.

Note 1.—Others gave the 3rd persons singular and plural of " *hidimi eskeré " as " ber *hidimi terri " and " berr *hidimi terri " respectively.

Note 2.—I could not discover whether " eskeré " by itself has any meaning and if so, what : but *vide* the 1st person plural present of " koigé " (*I come*).

To bathe.

Imperative (singular), kōra leski.
„ (plural), kōra lesku.

I shall bathe, or *I bathe*, kōra eskeré.
I am about to bathe, ai kōra eskĕré egé.

(The rest of the verb is the same as " *hidimi eskĕré," substituting " kōra " for " *hidimi.")

To be.

Singular. 1. ai erri (*I am*, or *I was*).
2. la lerri.
3. ber yi.

Plural. 1. to terri.
2. lo lerri.
3. berr yi.

Note.—I could find no difference between the present and the past tenses.

Note.—The following verbs seem to be irregular or defective throughout. They are reproduced in the form in which they were given.

To go.

Singular.	1. ai yuegé (*I go*).	ai yuegi (*I went*).
	2. la yuelé.	la yueli.
	3. ber siré.	ber tī.
Plural.	1. to tasári.	to tá·i.
	2. lo yábi.	lo yábi.
	3. berr sáré.	berr álu.

To come.

Imperative (singular), koi·o: negative, koi lŏghŏ.
„ (plural), kai·o.

Singular.	1. ai koigé (*I come*).	ai koigi (*I came*).
	2. la koilé.	la koili.
	3. ber kĕhĕré; kĕsĕré (kĕsĕri).	ber kettī.
Plural.	1. to taskaré (teskeré).	to takai (taka).
	2. lo kábé.	lo kábi.
	3. berr kăhăré; kasaré.	berr kăgălu.

Note.—*I am about to come,* ai koigé egé.
I am coming, ai erri koigi.
Were you coming? lerra koili.

To fall.

Imperative (singular), letté.
„ (plural) latowa.

Singular.	1. ai etteré (*I fall*).	ai etti (etté); ōsĭri (*I fell*).
	2. la letteré.	la letti (letté); lōsĭri.
	3. ber ketteré (katteré).	ber ketti (katté); ōtī.
Plural.	1. to tattowáré.	to tattowári; tōsĭri.
	2. lo lattowáré.	lo lattowáru; lōsĭri.
	3. berr towáré.	berr towáru; ōsĭru.

To play.

Imperative (singular), látorru.
„ (plural), láturru.

Singular.	1. ai attorré (*I play*).	ai attorrui (*I played*).
	2. la lattorré.	la lattorrui.
	3. ber tarré.	ber tarrui.
Plural.	1. to tattorré.	to tattorrui.
	2. lo lattorré.	lo latorru.
	3. berr tarré.	berr tarrū.

Note.—There follow some examples of the negative forms of verbs. In the present tense o is substituted for the final vowel only. In the past tense na is also put before the verb. In the 3rd person plural the o is absorbed in the u.

VERBS NEGATIVED.

Singular.	1. ai erro (*I am not*).
	2. la lerro (*you are not*).
	3. ber yo.
Plural.	1. to terro.
	2. lo lerro.
	3. berr yu.
Singular.	1. ai yago (*I do not, or will not, drink*).
	2. la yalo.
	3. ber yaro.
Plural.	1. to yado.
	2. lo yabo.
	3. berr yaru.
Singular.	1. ai na yago (*I did not drink*).
	2. la na yalo.
	3. ber na kiyaro.
Plural.	1. to na yado.
	2. lo na yabo.
	3. berr na kiyaru.
Singular.	1. ai na orrgo (*I did not ride*).
	2. la na orrlo.
	3. ber na korrio.
Plural.	1. to na orrdo.
	2. lo na orrbo.
	3. berr na kurru.

SENTENCES.

all of us, toi soco; toi soco ti.
all the fingers, bá burr soco; soco bá burré.
much talk, ber·ya ubwī.
another man, báru gé.
another girl, tellé gé.
that horse, hirrté to; hirrté tŏ tĭ.
that man, báru to.
our land, *dár árro; *dár gárro.

the world is large, iddi bitti.
the bowl is full, gá·u herri.
the bull is fat, bo tagurré.
the cow is fat, hirri tagurré.
he is bad, ber nowi.
I am old, ai { mōgu erri.
mo·u erri.
I am angry, ai { irri erri; ai gu irri ra erri.
irri ra.
I am a Zaghowi, ai Berri terri.
I am here, ai keggi ri erri.
you are useless, la kŭssĭnĭ lerri.
you are good, la kadá lerri.
you are a liar, la kuwai eli.
this is my brother, kī kerrbári eggī.
the woman is yours, bá·u kolloi.
the camel is yours, dī kolloi.
the horse is his, hirrté ko·oi·; hirrté koghoi.
the horse is theirs, hirrté kū·ī.

he is in front, { ber árré yi;
ber tahá ré yi;
ta dalla ri yi.
he is behind, { ber tătŭ.
ber tătŭĭ yi.
ber tătŭ ri yi.
I am above, ai bigi ri erri.
he is below, ber iddi ri yi (lit., *on the ground*).

I was struck, ai *dŭrŭbĭ égili erri; ai sai égili erri.
I was wounded, ai tūs égili.
I was drunk, ai *sakiri égili.

the rifle is broken, *mundŭk tailé yi.
the door is shut, *báb tékirri yi.
the house is closed, be' kokko.

he stole it last year, ber gu aigia ré kibirri.
they said I had stolen it, ai gu birrgi egili kīlu.

I found (saw) a stolen cow, ai hirri tebirré yi ri aigi.
" " *lost (strayed) cow,* ai hirri kuré yi ri aigi.

I was lying down but could not sleep, ai egié erri na talgé ego.

I came here, ai kégi ri koigi; ai ké gelgi.
you came here, la { kégili koili.
kégiri koili. }
he came here, kégiri ketti.

we were at work yesterday, ber·ya toi *hidimi teskeri.

he insulted me (till) I hit him, bergu ekibiá irregi.

the sun has set, utto kurūgĭlĭ.
the sun has risen, utto kăskŏrĭ.
the sun will set, utto kŭrŭli.
the sun will rise, utto kásŏri.
the woman walks, bá·u kélé.
the man walked, báru kégili.

I will descend, ai téĭgé; ai tégelgé.

come afterwards, usūgĭli koi·o.
at even I will lie down, ai { *īsé esegeré.
*ŭsŭtui esegeré. }

I shall be afraid afterwards, ai { usūti jŭgé.
usūgili. }

I shall stay a long time, saggiro { eseli.
soégi. }

I will bring it afterwards, { ai gu usūgili korrgé;
usūgili ai gu kettegé. }
I brought it before, ai gu ukárr korrgi; ukárri korrgi.
I stand now, ai *hassa asowli.
I shall stand to-morrow, ai sáli asowli.
I stood yesterday, ai ber·ya owli.
I will hit you afterwards, usū ai *dŭrŭbĭ lelgi.
I hit you before, { ai árr *dŭrŭbĭ lelgi;
ai ukárri árr dŭrŭbĭ lelgi;
ai gu ukárri la dŭrŭbĭ lelgi. }

bring the wood, uddu karro.
I am bringing the wood, ai uddu kattegé.
I left the girl, ai tellé bergi.
he wants milk, ber gu o gerré ; ber o gerré.
he wants much, ber abŭrŭ gerré.
he wants a cow, hirri gerré ; ber gu hirri gerré.
drink the milk, o ya.
dig the ground, iddi urru.
I eat meat, enni segé.
I have made ten bricks, ai gu *tīn { timm sigi. / timmi sigi. }
he has made many, ber gu abŭrŭ kisi.
talk Arabic! la, arrăma oia.
you talk Arabic, la arrăma oialé.
open the hut, be·a gi.
shut the hut, be·a kirri.
I killed the man, ai báru ligi.
he killed a sheep, ber gu bé·i kili.
you stole a donkey, la áddé birrli ; la u áddé birrli.
seize the thief, tilli kebo.
I seized the thief, ai tilli bigi.
I have ten cows, ai hirri { timmi tigé. / timm tigé. }
you have a shirt, la tári tilé.
do you know my name? { tirri eggi tulé. / tirr eggi tulé. }
the man killed his children, ber gu burr og[h]o kili.
the woman killed her son, bágu burr og[h]o kili.
she bore three children, burr wetté ságili.
we love our ruler, to gu kirré gárro { tágidi. / tahá tidé. }
God made everything, uddu gu soco obtōgili.
I hit myself, ai erri eggi *dŭrŭbi egi.
he killed himself, ber gu erri og[h]o kili ; ber gu tág[h]o [*i.e.*, tahá (or tá) og[h]o] kili (lit., *killed his head*).

I give, / *I gave*, } ai kégi ; ai gu kégi ; ai ĕgĭlĭ.
I gave it you, / *I will give it you*, / *I give it you*, } ai gu leké ; leké ; ai gu ĕgĭlĭ.
I gave Muhammed a piastre, / *I will give Muhammed a piastre*, } ai gu Muhammeto *girsh kégi.
I will give you a piastre, ai gu *girsh leké ; *girsh ĕgĭlé.

I will give that man a piastre, ai gu *girsh o to kégi.
I will give the man a piastre, ai gu báru gi *girsh kégi.

you give, you give it, la kéli; la gu kéli; lĕgĭrĭ.
you give it me, la gu égĭlĭ; la gu egĭlĭ.
you will give me a piastre, la gu *girsh égĭlĭ.
you gave him a piastre, la gu *girsh kéli.
you gave Muhammed a piastre, la gu Muhammeto *girsh kéli.
you will give Ahmed a piastre, la gu Ahmeto *girsh kéli.

he gives, / *he gives it,* } ber gu kéli; lĕgĭrĭ; ber kéli; ber gu lĕgĭrĭ.
he will give it you, ber gu lĕgĭrĭ.
Mohammed gave Ahmed a piastre, Muhammet Ahmeto *girsh kéli.
Mohammed will give you a piastre, Muhammet gu *girsh la ro lĕgĭrĭ.
" " " *me* " Muhammet gu *girsh ai ro ĕgĭrĭ.
the man gave me a piastre, báru *girsh ĕgĭĭ (for ĕgĭrĭ ?).
the man will give me a piastre, { báru *girsh egĭrĭ; báru gi go *girsh egĭrĭ.
the man will give you a piastre, báru *girsh lĕgĭrĭ.
give (plural) *the man a piastre,* báru gi *girsh ké·u.
give (singular) *the man a piastre,* báru gi *girsh ké·i.
give me a piastre, *girsh egé.
give me a little money, *girsh kulli egé.
give the cow grass, hirri e·erné ké.
we give, to kédi; tĕgĭrĭ.
ye give, lo tégili.
they give, berr kéli.
I see you, ai la laigé; la ai igé; ai gu laigé; ai lo lelgi; ai laigé.
I see that man, ai báru to igé.
I see him, ai gu igé; ai gu ber igé.
I saw ten cows, hirri timm aigi.
I saw its place (where it was), ai gu ké og[h]o aigi.
you see him, la gu ilé; la loelé.
you see me, la ailé; la ai ailé (ailé = ai ilé ?).
how many cows did you see? hirri lettétté aili.
he saw us, ber gu táiré.
Ahmed sees you, Ahmet lairé.
he sees you, ber gu lairé.
someone saw me, lié gu ághéi.
we see you, to u la laidé.
we see him, to ber idé.

he insults you, ber gu le biáré.
you like me, la [g]u ai gerlé.

you like him, la [g]u ber gerlé.
I left you, ai le bergi; ai gu le bergi.
you leave me, la u eberlé.
I fear you, ai la jŭgé.
you fear me, la ai jŭlé.
you fought me, la ai okila.
you hit me, la ai errelé.
I hit him, ai gu *dŭrŭbĭ egi.
he hit me, *dŭrŭbĭ egili.
I hit you before, ai gu ukárri la dŭrŭbĭ lelgi; ai árr *dŭrŭbĭ lelgi.
he fears you, ber gu la jŭré (julé).
I will show you it, ai gu le bugé.
my "brother" hit a gazelle, { kerrbári eggi bádo dŭrŭbĭ gĭlĭ; „ „ „ kirré.
I hit it, ai gu irregi.
I will hit you, aigu dŭrŭbi lelgi; la dŭrŭbi lelgi; aigu la dŭrŭbi lelgi.
you will hit me, la gu dŭrŭbi eli.

I meet you, ai gu la lági lelgi; ai gu la láděri.
I will meet him, ai gu lági egé; ai gu ber áděri.
you will meet him, la gu láděri.
he will meet you, ber gu la láděri.
he will meet me, ber gu ai aiděri.

I spoke to him, ai gu ber oiaigi.
you spoke to me, la gu ai oiaili.
he spoke to me, ber gu oiéári.
he spoke to you, ber gu la lakoiaiári.

I refused you previously, ai gu ukárr owi lelgu.
you refused me previously, ukárr la gu owi eli.
he refused, bergu owi egili.
he refuses (or *will refuse*), ber owili.

I am going to Dueim, Dueimi kéegé egé; ai Dueimi kéegé; lié Dueimi yuegé.
you come to the market, la *sūki yuelé; la lié *sūki koilé.
I come, ai koigé; ai u koigé.
I am going to Darfur, ai korra *dári yuegé.
I am going to my country, ai *dári eggi kéegé.
I am going to our country, ai *dár gár kéegé.
I am going to Kordofán, ai Kordofáli yuegé.
I am going to Mecca, ai *bait Macca ré yuegé (yuegé egé).
I will come to your village, ai gilli kollo ri koigé.
he fell into a well, bá ri katté (ōtī).
he fell into the pit, agha ri katté.
I took my things to El Obeid, ai ti eggi el Ebeidti dŏgi.

I sent my things to El Obeid, ai ti eggi el Ebeidti kuyégi.
I am about to come from El Obeid, ai el Ebeidté koigé egé.
I am coming from El Obeid, El Ebeidté erri koigi.
I came from Dueim, Dueima koigi.
you came from the market, la *sūké koili.
I came from Darfur, ai korra dáré koigi ; ai korra dára koigi.
I am going from Darfur, ai korra dára kéegé.
I am going from Kordofan, ai Kordofála kéegé ; ai Kordofálé kéegé.
I came from afar, ai guaré koigi.
I came from there, ai kotőra koigi.
I fled from the Sultan, ai kirré ré *hárabi egi.
I came from the wadi to the (inhabited) land, urré ré dári koigi.
I descended from the mountain, ai há ré téegi.
he fell off the house, bĕ·a ré katté.
I climb out of the well, bá ré hwoi egé.
he fell on his back, toto ketti ; tōsō ra ketti ; toto ra katté.
I am coming from Mecca, { ai *bait Macca ré koigé ; ai lié Macca ré koigé.
Muhammad will take a piastre from you, Muhammet gu ké kollo ré girsh biré (lit., *from your place*).
I was in El Obeid, ai el Ebeidti erri.
I am in Kordofán, ai Kordofáli erri.
put it in the middle, derri ri tel.
In Dervish times I was there, *Dorowīs *ŭghŭto kotori erri.
I stood on the mountain, ai há tendili owli.
to-morrow I shall stay at work, sáli *hidimi ri asowli.
my home is outside Darfur, *Dár eggi korra *dáré terri yi.
I am here, ai kégi ri eggi.
In the pit, agha ri.
put it on the ground, iddi ri tel.
you are on the ground, iddi ri lerri.
I stand on the ladder, ai *sellimi asowli.
by night, gilli ru.
after the rains I will go, usu gé kéegé.
I will start after sunset, ai *mikhribé tătŭ ré goegé.
after the rains, gé { ré / ra } { tătŭĭ. / tătŭ. }
I came after you, ai la ré tătŭ ré koigi.
after breakfast, go' ra { tătŭ. / tătŭĭ. }
I will start before sunset, ai *mikhribé { tăhá ré goegé. / dalla ré goegé. }

before the rains, gé {ré / ra} {tăhăi. / dalla. / dallai.

I came before you, ai la ré {dalla ré koigi. / dalla ro. / tăhá ré.

before breakfast, go' ra dallai.

before the night, gilli ré dalla ro; gilli arra dallai.

I am afraid of the thief, ai tilli ré jŭgé.

I wounded him with a spear, ai gu ku ru tĭbĭgĭ.

I am subject to the sultan, {ai kirré ré *tái erri; / ai kirré shīgé.

I had three children by her, ai gu burr wetté ber ri kattegi.

I carry bricks on my shoulder, tungullé suggu eggi ri tebigé.

you and I, la ru ai ru ti; la ru ai ru.

this one and this one eat, kī ru kī ru seré.

horses, camels, and donkeys are all good, hirrté ru dī ru áddé ru soco kadái.

the man and the woman, báru ru bá·u ru.

he and you are together, ber ru la ru ké lakoi lerri.

I and Muhammad are together, ai Muhammeto ké lakoi terri.

Muhammad and Ahmed are together, Muhammeto Ahmeto ké lakoi.

I and my brother came, ai ru kerrbári eggi ru takai.

I came with my brother, {ai kerrbári eggi ru éyi koigi; / kerrbári eggi ai ru éyi koigi.

I came with Ahmed, ai Ahmeto éyi koigi.

I am going with the cows, ai hirri ru éyi kéegé.

I am with him, ai éyi.

I am with Muhammad, {ai Muhammeto éyi; / ai Muhammeto éyi erri.

I am with Abbas, ai Abbaso éyi erri.

Where is Muhammad? He is with me, Muhammet léri? ai ru éyi.

I am with him, ai ber ru éyi.

Note.—"Éyi," it was said, can only be used when the speaker is one of the persons linked to another person or thing: it cannot, however, be consistently translated as *with me.*

he insulted and beat his wife, bágu og[h]o kibiá kirré.

are there soldiers or not? *askarri ya yo.

do you like meat or not? {la enni gerla gerlo; / la enni gerla ro.

are there thieves in your land or not? *Dár kollo *harámi ya yu.

is merissa good or bad? {guru kadáro nowi; / guru kadá áro nowi.

did you insult him or hit him? la biáli áro irreli.

do you like merissa or water? la guru ti tá til áro bī ti tá tili.

Is Dueim far or near? Dueim duai áro atuī.

I know him, ai gu tōgé.

I do not know him, ai gu tōgo.

you do not hear, la tallo.

you did not hear, la na tallo.

you are not a Zagháwi, la Berri lerro.

I do not (will not) work, ai *hidimi eskero.

there is no stone, há yo.

there is no horse, hirrté yo.

your horse is not (s.c. *here*), hirrté kollo yo.

I have no money, ai *girs tigo; ai *girs la tigo.

he is strong, ber kunnu yi.

he is not strong, ber kunnu lăto.

I ate meat, ai enni segi.

I did not eat meat, ai na enni sego; ai na enni la sego; enni na la sego.

I stole a donkey, ai áddé birrgi.

I did not steal a donkey, ai na áddé birrgo; ai na áddé la birrgo.

there is, yi.

there is not, yo.

I am a slave, ai immé (ummé) erri.

I am not a slave, ai immé (ummé) erro.

the house is mine, bĕ·a eggī.

the house is not mine, bĕ·a eggi lăto.

I like you, ai le gergé; ai gu le gergé; ai *hibbi lelgi.

I do not like you, ai le gergo; ai gu le gergo; ai *hibbi lelgo.

I see you, ai laigé.

I do not see you, ai laigo.

I want it, ai gu gergé.
ber gergé; ai gu berti gergé.

I do not want it, ai gu gergo.
ber gergo; ai gu berti gergo.

do not hit him, la *durubi ĕlŏghŏ; la irrelo.
ĕlŏgŏ.
ĕlo.

the bull is no good, bo kékéro.

I have none, tigo.

I am not willing; I do not intend, ai tá tigo.
tăhá tigo.

come, koi·o.

do not come, koi lŏghŏ.

go, kello.

do not go, ké lŏghŏ.

I did not hear your talk, ai bádī kollo na talgo.
you „ „ *my* „ la bádī eggi na tallo.
they have no money, berr *girs la kītilū.
I am not going to stay here, ai kégi eselo.
I do not intend going away, ai tá tigo kéego.
why has he not come? ber lua *shannu na kettiu.

it is mine, eggii (eggi yi).	*it is not mine*, eggi to.
it is thine, kolloi (kollo yi).	*it is not yours*, kollo to.
it is his, ko·oi (ko·o yi).	*it is not his*, ko·ōto.
it is ours, kárroi (kárro yi).	*it is not ours*, kárro to. kárro lato.
it is yours, kollui (kollu yi).	*it is not yours*, kollu to.
it is theirs, kū·i (kūi yi).	*it is not theirs*, kū·uto.

who are you? la lai; la lua lerri.
who is that? to lai.
who is this? kī lai.
who is your chief? kirré kollo lai.
who is he? ber lai.
what is this? kī luai.
what do you fear? luai jŭlé.
what do you want? lua gerlé.
what did he say? ber lé kī.
what sort of game is there there? bádo kotori yi *gins og[h]o luai.
what shall you do? lua *ámĭli elé.
what are you doing? lua dilé.
what have you done with it? lua ro dili.
what do you do with a mat? kubbá lua ro dilé.
why are you afraid? lua ré jŭlé.
why are you staying here? I am staying, keggi lua ré lelli lerri: ai elli erri.
why did you refuse? lua ré owieli.
owéli.

why have you come here? kégi lua ré koili.
why don't you go? lua *shannu la kéelo.
why is the house shut? be' lua *shannu tékirri yi.
when shall ye start? lo léri go ebé.
when did you start? léri go eli.
when did you come? la, léri koili.
where is your "brother"? kerrbári gollo lōgĭlĭ.
lóri.
where is the horse? hirrté lōgĭlĭ.
hirrté lóri.

where is your grandfather ? err gollo { lōgĭlĭ.
 lóri. }

where are you ? la lóri ; la lōgiri ; la, lór lerri.

where are you going ? la { lōgĭrĭ yuelé.
 lóri yuelé. }

where has your father gone ? abba kollo { loghiri kégili.
 lóri kégili. }

where did you come from ? lóri koili.

where did you go ? la { lōgĭrĭ
 lōĭrĭ } { kéeli.
 yueli. }

how many cows have you ? hirri lettétté tilé.

how old are you ? (lit. *how many years have you ?*) gé gollo letté.

how many piastres ? *girs letté.

how many people ? o letté.

how many people are there ? o lettétté yi.

how many bricks have you made ? *tīn { letté sili.
 lettétté sili. }

how many days did you travel ? kobbái lettétté kéeli.

If you go to El Obeid you will find your brother. { la El Ebeidti yuelé
 kerrbádi gollo láděri. }

if you talk I can't hear what is said, oi alé li bádī tálogo.

what should you do if you left Bara ? la Bara ré surrli { li
 ri } lua dĭli.

if you beat me, I will shout, la gu *dŭrŭbĭ eli ri eshīré.

if you shout, I will beat you, { la leshīré { li
 ri } *durubi lelgi ;
 la leyiri li *durubi lelgi. }

if you steal, I will imprison you, la tilli dili ri *hŭbŭsi lelgi.

when he has spent a month in prison he will come out. { bergu *sĭgĭni urrté *temmi séári
 li kásori (or, sŭré). }

call to him to come here, gu li kékeri ketti (kitti).

call to them to come here, gu li kékeri kagái.

she died like a dog, birri dilĕru lié.

a monkey is like a man, utturré báru dilĕru.

it's all alike, dilé·i.

I came to work, ai *hidimi digé ru koigi.

he ran to seize me, ai ebiré ru kihirrii.

he stopped to play, tarru ré ru owli.

he killed a goat to eat, bé·i seré ru kili.

he fetched water to drink, bī yaré ru kodoli.

he brought wood to put it down, uddu togoi ré ru kattéi.

I shouted that he might hear, ai *háraga egi bergu kitálo yegé (*i.e.,* kitálo·i egé ?);
ai kitálo yegé *háraga egi.

he did it that I might laugh, káli lōgili obtōgili.

he did it that you might laugh, la káli lōgili obtōgili;
bergu obtōgili laro káli lōgili;
ber gu la káli lōgili obtōgili;
láro káli liséré ru obtōgili.

he did it that we might laugh, ber gu káli lūgili obtōgili.
he did it that they might laugh, ber gu obtōgili o to kálilūli.

he told me to laugh, bergu káli lōgili okaiaiári.
he told you to laugh, bergu káli lōgili lokaiaiári.

we are afraid to go to Darfur, to jŭdĭgĭlĭ, Dárfur tasáro (i.e., *we are afraid: we shall not go to Darfur*).

you are afraid to hit me, la jŭlĭgĭlĭ, errelo (i.e., *you are afraid: you won't hit me*).

I refused to go, ai owi egi kéego; ai gu owi egi kéego (i.e., *I refused: I did not go*).

I refused not to go, ai owi egi kéegi (i.e., *I refused: I went*).

you refused to go, la gu owi eli kéelo.

he refused to go, ber gu owiegili siro; owiegili yuego gili; ber gu owiegili na kéegilo.

(*N.B.*—owiegili is sometimes pronounced as ōigili.)

do you know how to write? la tulé *katibi ela.
can you kill it? la tag[h]álé lila.
cannot you lift it? la tag[h]álé kibbi elo.
is there any water? bī yá.
are you a Muslim? la *Muslim lerra.
how do you do? ŭhŭ lerra; ŭhŭ koili (koilé).
good morning! kadá lĕgé (i.e., *did you sleep* (*lie down*) *well?*).

speak slowly! dĭrá' ro oia.
hold it fast! kadá bi; kunnu bi; kunnu ru bi; kadá kĕbi.
I was angry, ai irri ra erri; ai irri erri.
I was very angry, ai soco irri ra erri.

I want to kill the man, ai báru ligi ru tahá tigé;
ai o gi ligi ru tahá ri tigé.

I want you to give me three piastres, la gu *girsh wetté egili ti tá tigé.

I want to return to Darfur, ai tá tigé Dárfūri kéegé egé;
ai surmi égili Dárfūri kéegé egé.

I want to go now, ai *hassa tá tigé kéegé egé.

I want to drink (*I am going to drink*), ai yági egé.
" " " *eat* (" " " " *eat*), ai segé egé.
I want to descend, ai téigelgi egé.
{ *I want* (*wish*) *to drink water*, ai bī gergé yagé.
(*I want water to drink*).

the horse belongs to that man, hirrté o to kīi (*i.e.*, tokī yi).
" " *belonging to that man*, hirrté o tokī.
the horse belonging to this man, hirrté o kikī.
that horse belongs to that man, hirrté to báru to kīi.
the sugar belonging to the merchant, *sukr *tágir ki.

I have no money but one piastre, ai *girsh la tigo *girsh lakoti tigé.

I bought a cow for £3, a hirri *giné wé ro lági.

after two years have passed the man will die (or, *he will die*), { gé shwé gu hadal táregi báru shĭlé ; gé shwé gili oghwiéru shilé ; ebé shwé shi shilé.

I spent the rainy season in Darfur, ai Dárfuri gé táregi.

ten years have passed, { gé timmu táriári ; gé timmu kōgui.

I am clever at killing game, ai *ágil erri bádo luégi.

I will { *complete*, *spend a month*, } ai urrté *temmi séegé.
he will spend a month in prison, urrté *sĭgĭni *temmi séeri.
the work is finished, *hidimi *temmĭgĭlĭ.

I will complete my work, { *hidimi eggi *temmi séegé.
ké " " "

the thief has stolen four cows, tillé hirri ishéti kibirré kiti.
the chickens ate my brother's food, kutti kerrbári eggi go' kiseru.
someone shouted, lié urrūgili.
someone is shouting, lié urruli.
someone abused me, lié gu ekibiai.
someone hit me, lié gu ekerré.
he will go there, ber lié kotori siré.
he will come here, ber lié kĕsĕri.
I am going to Dueim, lié Dueimi yuegé.
I am going to market, ai lié *sūki yuegé ; ai sūki yuegé.
I came here, ai lié koigi.

I shall come from Mecca, ai lié Macca ré koigé.
he is walking, ber lié siré.

I spat, ai lié ăfi wurgi; ai ăfi wurrgi.

Note.—It will be seen that *lié* is a sort of indefinite particle of vaguest meaning. It was always used when I asked for the translation of a sentence beginning with an indefinite "someone . . . ."; but in all other cases it was apparently immaterial whether *lié* was inserted or omitted.

I can only suggest a comparison between it and the English "just," *e.g.*, "I just came here"; "I just spat"; "it was just someone who shouted," etc.

1. *akhu eggi bágu kodolé kobbái timm gu tár egi (p 329) El Ebeidti
brother my woman married days ten passed El Obeid
kodōli īa og[h]o owi egili El Ebeidti siro gili ai ru *akhu eggi ru
took mother her refused El Obeid go I and brother my
*mál kédūdi owi edi.
kédu·edi
dowry give refused.

(My brother married a woman: after ten days he took [wanted to take] her to El Obeid, but her mother refused to let her go; so I and my brother refused to give her the dowry.)

2. ai Ahmeti oi aigi *Darfūri kello oghi ber na bádī kitálo (pp. 325, 326).
I Ahmed told Darfur go to (?) he talk not heard.

(I told Ahmed to go to Darfur, but he did not hear what I said.)

3. Kirré gu okai aié Darfūri sué gili iri so go ai owi egi hirrgi
the Sultan told me Darfur stay said ? ? I refused ran away
ké gelgi.
(came here).

(The Sultan told me to stay in Darfur, but I refused and ran away and came here.)

4. *Dár gárro o kutulū *kŭtŭpi (كتب) lu. err gárro *samáni
Country our people don't know to write ancestors our time
*kŭtŭp arrow kī mĭnu *kŭtŭp gé tudŏ.
books Arabic belonging to apart from (?) books other know not.

(In our country the people do not know how to write: since our ancestors' time we have known no other books than Arabic ones.)

5. ai *akhu eggi ru Bára ré takai *shaghlé teskĕré *haasa El
I brother my and Bára to came work now El

Ebeidti kégili ai kékeri elli erri ai ŭsū El Ebeidti kéegé
Obeid he has gone I here am staying I afterwards El Obeid go

*osta (اوسطى) *girsh lakotti egii ai tá tigo kerr bári eggi
overseer piastre one gave me I was not willing brother my

dai·i tailé yi gĭ lĕgi kitágaré *hidimi diro.
leg broken ? ? could work not do.

(I and my brother came to Bara to work, but now he has gone to El Obeid and I am left here. Afterwards I shall go to El Obeid. The overseer gave me one piastre, but I declined it (lit., had no head, or mind). My brother could not work because he had a broken leg.)

6. Báru égia ré lié *ahl (أهل) og[h]o kăgá héré ru kăgălu.
man last year died relations his came {to buried / and buried} came.

Bá·u eyiru ebbi kăgălu.
women {shouted tears / wept} came.

(The man died last year and his relations came to bury him, and the women came and wept.)

1. o wéti aiyi bádo luiré ro álu. *mundūku *rusásu kiti Bádo
men three ? gazelle to kill went rifles bullets had gazelle

shitti ágilu ; liégu (p. 329) *mundūk og[h]o kibbi gilé bádo *dŭrŭbi lĕli Bádo
two saw ; one rifle his raised gazelle shot gazelle

urré ri kihirrii : báru dĭyŭgŏré kihirrii : dūgili. *ŭsŭ bádo ághi
wadi into ran man on its tracks ran was tired. At even gazelle saw (found)

lié yi.
dead.

(Three men went off to kill gazelle: they had rifles and bullets: they saw two gazelle, and one (of the men) raised his rifle and shot a gazelle. It ran into the wadi, and the man ran on its tracks till he was tired. At even he found the gazelle dead.)

8. ai[1] [lié] bittī derri ri kéegi (or, ai[1] [lié] kéegi ri bittī derri ri) báru
I trees among walked man

aigi : oi aigi *akhu eggi aila ailo. Bergu kī *girsh egi legé ké
I saw : I said brother my have you seen have you not seen. He said piastre give me place

og[h]o lágógé.
his I will show you.

(I was walking among the trees and saw a man. I said to him, "Have you seen my brother or not?" He said, "Give me a piastre and I will show you where he is.")

[1] The omission of "lié" here makes no difference (cf. p. 329).

9. Kirré gu o [1]lé bé·i birri ri ághi; ber gu *hŭbŭs ĕgĭlĭ
The Sultan man sheep stealing saw him imprisoned

*hakimi (حكم) ĕgĭlĭ hirri timmu bé·i mundáro kégii. Báru owi ĕgĭlĭ kī
sentenced cows ten sheep owner give. The man refused said

Kirré la shīgōgili. Kirré gu u timm huetté saigili ru dergilé kégili.
Sultan was not subject to. Sultan times ten five flogged and released went

U gé ré hirri biáré; Kirré gu kili.
time second cows seized Sultan killed.

(The Sultan caught a man stealing sheep, so he imprisoned him and sentenced him to pay ten cows to the owner of the sheep. The man refused, and said he was not subject to the Sultan. The Sultan gave him fifty lashes and let him go. Again the man seized some cows: so the Sultan put him to death.)

10. La *sūké *girsh aili ru *gibbi tīlīlĭ (p. 327) Kirré gu bá lo[2] iggira dai
you market piastre saw pocket hide Sultan hand right foot

gollo ummura timmlĕli. Tári *tágir (تاجر) kī (p. 329) berli li leli.
your left cut off. cotton-goods merchant belonging to steal kills.

ai tili ré jugé.
I theft fear.

(If you see a piastre in the market-place and hide it in your pocket, the Sultan cuts off your right hand and left foot. If you steal the cotton goods belonging to a merchant he puts you to death. I am afraid to steal.)

11. bŭttū kĭshĭ lĕgé debbĕlé korrgé bághá bīgé egé goégili
rain falls hoe I fetch corn sow it started up

tibé tūgé. iddi tarrba bágu á koi giré tánda kisisé
cultivation hoe. earth autumn women went stalks cut heads collect

kīré ru álu.
thresh went.

(When the rain falls I fetch a hoe and sow the corn. [Afterwards] it starts up and I hoe the cultivation. [Then] when it is autumn the women go and cut the stalks, collect the heads and go and thresh them.)

12. ai be' eggi ri gilliá talgé egé erri ri *haraka tálógi ai
I house my in by night sleep in noise heard I

gilmé egili[3] bá·u eggi *angarībi (Sudan Arab عنقريب) ketté ai lōgiri
thought wife my bed fell I found

birri gu gátu kŭdŭri: ai go égi kerrbári eggii gūgi: berr kăgălu kīlū
dog bowl throw upset I got up friends my called they came said

[1] "lié"?
[2] ("gollo"—"your"?)
[3] Gilmé eggi ri—"in my thought"?

luégili ai gu oi aigi: to gu ku kettĕdi birri sháro gerdé
"what is it?" I told we spears brought dog (?) search for (?)[1]

to na be' keddi aido · usūgĭlĭ lié gu (p. 329) terri birri ághi (or, usūgĭlĭ
we house inside not saw afterwards someone outside dog saw.

to o liégu terri birri ághi. Birri kihirrii: to gu bidi lĭdi: kerrbári eggi
dog ran away we caught killed friends my

hū koū birri djidi. Bágu eggi talgi ré goé selgi sháro irri ra.
grave dug dog we buried. wife my sleep from awake (?) was angry

ai gu há [2]tahágoré durgi: bágu birri dileru lié. socoi.
I stone at her head threw woman dog like died. that is all.

(I was asleep one night in my house and heard a noise: I thought my wife had fallen out of bed; but I found it was the dog had upset a bowl. I got up and called my friends, and they came and asked what was the matter. I told them: then we fetched spears and searched for the dog. We did not find (see) it in the house, but later someone saw it outside. The dog ran away, but we caught it and killed it. My friends then dug a grave and we buried it. My wife was angry because she had been awakened from sleep, so I threw a stone at her head, and she died like the dog had died. That is all.)

13. Báru lii hu ré dodi diré iggi ri tegaidi *tūl (طول) og[h]o ri
Man died grave to took side right on laid length his on

tegaidi tahá gu *sa'īdti koidi (or, kuedi) dai og[h]o birrii ri koidi errshé
laid head south put legs his north to put earth

bigi og[h]o ré durdi tahá og[h]o ré há shikĕdi tatu[3] og[h]o ré há
above his from threw head his at stone set up at his feet stone

shikĕdi berdi.
set up left.

(A man died and we took him to his grave and laid him on his right side at full length. We put his head southwards and his feet northwards and threw in earth from above. At his head and at his feet we set up a stone and left him.)

Explanatory Notes of Marks used.

1. Some cross references are given in the text of the index in round brackets: the numbers refer to the pages.

2. *—the word so marked is, or seems to be, Arabic in its origin. For numerous Arabic words no Zagháwi equivalent could be found. The Arabic word is given in each case in the margin.

3. ″—A double accent denotes the syllable on which the chief stress falls in pronunciation.

[1] Or "want" v. sub gergé "I want."

[2] Tahá og[h]o ré?

[3] For "tatu" *vide* sub "after."

4. A dot between two letters denotes that there is a slight pause between them, and they are not pronounced as a diphthong.

5. ˇ denotes a short syllable.

¯ denotes a long syllable.

' at the end of a word thus bo' (a stick) denotes that pronunciation is syncopated and ends suddenly: contrast bo (a bull) which is pronounced as it would be in English.

6. A word enclosed in a round bracket is a variant in pronunciation of the preceding word, and either may be more correct: the variant in the bracket was as a rule not so frequently used as the other.

7. Words or sentences in juxtaposition and separated by a semicolon are alternatives, the semicolon being equivalent to "or." In the sentences (pp. 318–330) alternatives are often joined by a bracket (instead of separated by a semicolon).

8. A letter enclosed in a square bracket is doubtful: sometimes it seemed to be pronounced; sometimes not: *e.g.*, og[h]o (his) was sometimes pronounced ogo, and sometimes ogho. (Vide note 2(c) below.)

Pronunciation.

1. á is pronounced like the Arabic alif or the second *a* in the English word "pap*a*."

   é is pronounced like the French é.

   ī is pronounced like the English ee.

2. All letters are pronounced as they would be in English with the following reservations:—

   (a) *s* and *sh* seem to represent the same letter and to be interchangeable; but the latter never has the *h* sound so strongly marked as in the English *sh*. In conjugating verbs I have uniformly used s throughout for the sake of simplicity (except eshīré q.v.)

   (b) *r*. Some of the Zagháwa seemed to find difficulty in pronouncing r between vowels. Whether this was due to their defective intonation, my hearing, or there being used a letter distinct in sound from *r* I cannot say (cp. the word for "where"). vide sub (e).

   (c) *g* and *gh*. g is always hard, and is generally almost indistinguishable from *k*. When g[h] is written it represents a sound something like the Arabic غ but with the g sound predominating.

   (d) *d* often approximates in sound to *t*.

   (e) *l* is often confusable with *r* and the two letters seem almost interchangeable; vide especially the third persons of the past tenses of the verbs.

3. There seems to be a tendency to affix a short vowel to a word which is followed by another beginning with a vowel.

Part II.

The "gebel" of Mídób lies almost due west of Omdurman and covers about 27 miles east and west and 37 miles north and south, according to the French service maps.

Round about it are scattered a considerable number of villages of which the inhabitants cultivate crops of "dukhn" in its season, and for the rest of the year tend their herds of sheep, which are very considerable. The water supply of the "gebel" is abundant. The depression on the west side of the "gebel" and known as "El Málḥa" contains valuable deposits of "natron" (rock-salt) lying one or two feet just below the surface of the water; it is said to be about half a mile or more square. The nearest neighbours of the people of Mídób are—on the east the nomad Kabábísh Arabs, on the north the Zagháwa, and on the west and south the Berti of Dárfūr.

The "gebel" of Mídób and its various watering places have for the most part both an Arabic name and a native name; *e.g.*, the native name for "gebel" Mídób itself is "Tiddi ór"; a Mídóbi is "Tiddi"; the watering place known to the Arabs as "El Serayf" ("Zerrif" on the French maps) is "Kundul" to the Mídóbis.

The sub-divisions into which the people of Mídób divide themselves are as follows:—

Kágeddi.	Torrti.	Usutti.
Urrti.	Turkeddi.	Ordarti.

They speak of themselves as an ancient colony of Maḥass and Danagla from the Nile, but have no idea at what time their migration westwards occurred.

They say that some of them who have visited the river have found that the language of Mídób greatly resembled the dialect of the Maḥass or the Danagla, and give as an example the word "Kósi," meaning a wooden bowl (for eating from) both in the tongue of Mídób and of the old inhabitants of Dongola.

The names of a number of the peaks in "gebels" El Ḥaráza, Um Durrag and Abu Ḥadid closely resemble Mídóbi words, and it is undoubted that immigrants of cognate race to the ancient inhabitants of the country round Dongola have settled in the three hills mentioned, as they are alleged to have done at Mídób.

The common prefixes *Ka*, *Kur*, *Kar*, found in the names of several of the peaks in El Ḥaráza and Um Durrag, *e.g.*, Karshūl, Kuriddi, Kurkayli, Kalūdi, Karshennad—may possibly correspond to the Mídóbi word "kărr," meaning a village.

On the other hand, the word "Tiddi" at once suggests the Tedá (Tibbu), who to a large extent include the Zagháwa; the Zagháwa language appears to resemble that of Mídób; the Zagháwa are close neighbours of Mídób; and there is no doubt that the nomad Tibbu used to roam the country, including northern Kordofán and the Bayūda desert, and known in the middle ages as the desert of Gorham or Goran. These Tibbu are themselves of partly Berber stock, as are many of the inhabitants of Dongola and Maḥass, and herein may perhaps be found the source of the alleged migration of Danagla and Maḥass to "gebel" Mídób.

The Mídóbis themselves disclaim all relationship with the Zagháwa and say they do not understand their language. It is just possible they are in some way connected with the mysterious "Anag" who are fabled to have inhabited northern Kordofán. At present, in addition to the village headmen, they have a supreme "mek" or "náẓir" (Arabic) over them.

Their tribal customs show traces in certain points of an old system of matrilinear succession such as was in vogue among the ancient nomad tribes on either side of the Nile (*e.g.*, the Beja), and in the old Christian kingdom of Dongola, thus:—

It is said that if a "mek" dies, the succession passes not to his sons but to his sister's son, or, in default, to his maternal aunt's son; and again, if A murders B, B's relatives take vengeance in the first instance upon A, but failing him upon his sister's son or his maternal aunt's son. On the other hand, in the case of inheritance the sons are given two shares to the daughters' one. I have heard Arabs say that they can remember a time when Mídób was under a female ruler. Before any enterprise is undertaken a soothsayer is consulted for omens. This soothsayer is always a woman, and is called "tódi." She takes seven cowries and throws them down together at random on the ground; from the position in which they lie relatively to one another the "tódi" deduces good or bad luck for the venture in hand.

The following are a few of the more common words used in the Mídóbi dialect, though a large portion of the people can now make themselves understood in Arabic.[1] A few sentences are also given.

a man (*or men*)—Arabic, رجل—ett.
a woman, iddi.
an old man (*an elder*), bang·utti.
a youth, imanni.
a person—Sudan Arabic زول—irr.
a child, 'utchi.
a girl, tuddi.
a cow, tur.
a bull, kūt.
a camel, ondi.
a sheep (*or sheep*), tī.
a goat (*or goats*), pell.
a horse, porrnyi.
a donkey, utchi.
a dog, pewrl.
a cat, pīsi.

[1] The writer has not visited "gebel" Mídób. It lies in the territories subject to the Sultán of Dárfūr. The information given in this paper was obtained from Mídóbis who came to Kordofán to trade in sheep or work for hire, and who understood Arabic sufficiently well to render conversation easy.

Note as to pronunciation, &c.—

d and *t* are often barely distinguishable. Pronunciation varies according to what may be the adjacent letter.

u is pronounced as *oo* in the English "w*oo*d" except when marked with ˘ or ¯ over it. In the former case it is pronounced as the *u* in "b*u*t," and in the latter is deepened in sound as in the English "b*oo*r."

g is hard.

é should be pronounced as the French *é*.

ó " " " English *oa* in "m*oa*t."

á " " " Arabic alif.

* prefixed denotes an Arabic word or derivative.

a monkey, tanni.
an elephant, ŭmmat.
a giraffe, timmit.
a tiang, pŭsŭngyi.
a gazelle, pési.
a lion, pang·atti.
a bird, ergósár.
the earth (*or the ground*), konnukudi.
a tree, kár.
water, urtchi.
a mountain, ór.
a pond, pót.
a road (*or track*), tá.
grass, gétchi.
a stone (*or rock*), ulli.
a village, kărr.
corn (*dura*), urdi, *or*, urti.
meat, osongyé.
corn (*dukhn*), u'di, *or*, u'di *dukhn.
chicken, tartúma.
country, *dár, *or*, tár.
fire, ussi.
small hill or rock, at·ti.
milk, itchirri.
eggs, eidi.
iron, tessi ("tessi" also means the Arabic "dihn").
rain, arri.
clouds, techirri.
the sky, arnda.
wind, essi.
leather, adangyi.
a knife, erdi.
a sword, fudár.
a waterskin, tuli.
a saddle, kommorgi.
wood, orgi.
clothes, arro.
rifle, *bunduk.
a sheepskin rug, korti.
a native house (*or hut*), ŭ[t].
sun, păssăr.
moon, ung·ul aydi.
God, Telli.
a sheikh (*or ruler*), sirgi.
father, abba.
mother, iya.
sister, ési.
brother, éniki.
grandfather (*paternal or maternal*), ubba.
grandmother (*paternal or maternal*), ŏwa.
paternal uncle, ăja.
maternal uncle, tīga.
paternal aunt, anya.
maternal aunt, ingetcha.
a son, kat.
a daughter, asi.
beer (*"merissa"), kukur.
bowl, kósi.
rope, tĕgĕdi.
salt, kuloh.
slave, pédi.
slave-woman, tót.
star, or stars, ongyedi.
a certain person (Arabic, "fulán"), aié.
thirst, ayr.
"*wadi*," ū[t].
sunrise, sá·i, *or*, *subáh.
sunset, *moghrab.
rainy season ("*kharif"), sai·i.
summer ("*seif"), pári.
winter ("*shitta"), itchi.
time of spring showers ("*rushash"), tang·uddi.
autumn ("*dirrat"), urng·ul.
the world, *dunya.
a devil, *sheitán, *or*, ŭri.
darkness, sí.
mouth, ál.
a tooth, kuddi.
head, orr.
hair (*of head*), orr tédi.
face, orro.
ear, ulgi.

forehead, onnyé.
eye, pīdi.
foot, otti.
leg, tangagi.
knee, urrut.
elbow, ayi.
arm, orbidi.
hand, usi.
fingers, usunbarandi.
thumb, kurko.
the little finger, usun'utchi.
first finger, kulkerti.
middle finger (*sic*), tŏserūsi.
third finger, urpīndeka.
foot, otti.
toes, ottunbarandi.
big-toe, ottunkurko.
little-toe, ottun'utchi.
first toe (*sic*), tŏserotti.
middle or third toe, urpīndeka.
chest (*of body*), ŏ'wi.
back, say[t].
neck, ayr.
beard, ketcheddi.
black (*or dark blue*), uddi.
red (*or bright yellow*), kayli.
green, tessé.
white (*or grey*), addé.
pale green (*or pale brown*), sīri.
belly, tŭr.
blood, uggur.
cheek, urmi.
a year, isénné.
a month, ung·ul.
a day, ū.
a name, urri.
a "feki," pukkī.
a diviner (*female*), tódi.
I, oi.
you (*sing.*), īn.
he (*or she*), ón.
we—if "we" refers exclusively to Meidobis, ádi; *if "we" includes any single stranger or non-Meidobi*, anga.[1]
male, ayri.
female, arr.
talk, ál (*lit. "mouth"*).
good, tĭsīnu.
bad, kábm.
fat, tŭgay'.
many, aingya.
all, tuma.
true, ágé.
false (*or a lie*), orgadé.
yes, *aiwa.
no, pám, *or*, mám.
big, kóré.
small, sungutchia.
clever, bársa.
far (*adj.*), táséa.
near (*adj.*), ŭgĕdítcha.
North, South, East, West (*as in Arabic*)—*days of the week also as in Arabic.*
here, indé.
there, naandoré.
when? ondáré.
how many? nītcha.
where? ikinno, *or*, onderri.
my, ewn.
your, ná.
his (*or her*), naa.
before (*adv.*), ŏrré.
afterwards, bítáné.
to-day, emíddé.
yesterday, pélé.
why? indo.
to-morrow, séndeŕé.
the day after to-morrow, séndi tuna anúddé.
the day before yesterday, pung·udé.

[1] In conjugating verbs I have used *ádi* as a rule. The form of the verb is unchanged whether *ádi* or *anga* be used. Both are used irrespective of the number of persons included in the term "we."

1 pirrki; *once,* ai'pirrkeré.
2 uddi; *twice,* ai' ridderé.
3 tási, *or,* dási; *thrice,* ai dáseré.
4 égi; *four times,* ai égeré.
5 téchi, *or,* déchi; *five times,* ai décheré.
6 korrchi; *six times,* ai korrcheré.
7 ollotti.
8 iddi.
9 ukuddi.
10 timmigi.
11 timmigĕró borchírredi.
12 tornoddi.
13 seldási.
14 selégi.
15 seldéchi.
16 selgorrchi.
17 sellotti.
18 seliddi.
19 selukoddi.
20 sheddedi.
21 shedded tóm borchi.
22 shedded tór uddi.
23 shedded tón dási.
24 shedded tór égi.
25 shedded tón déchi.

The central word when alone is pronounced tór.

30 tudási.
40 tuégi.
50 tudéchi.
60 tugorrchi.
70 tuollotti.
80 tu iddi.
90 tu ukoddi.
100 immil.
1000 irrkil.

(Ordinal numbers not understood.)

a Mídóbi (inhabitant of Gebel Mídób), Tiddi.
Arabs, Sulli.
Zagháwa, Kébádi.
Fur, Kūrká.
Arabic (language), Selna.

where is the man? an ett dikinno.
where is the girl? tuddi ikinno.
where is the water? urtchi ikinno.
who are you? īn gūrené.
how many piastres? *girsh nītcha.
where are you going? īn ondesūri.
where have you come from? īn onde bulĭ īhŏno.
what is your name? ná urri négŏda.
when did ye go? ung'u ondáré īhiru.
whose is the horse? kurna porrnyi? *or,* kurn porrnya.
who is he? ón guré.
the donkey's saddle, utchi ng kommorgi.
the horse's saddle, porrnyi ng kommorgi.
*the *wakíl [agent] of the sheikh,* sirgin *wakīl.
gebel Mídób, tiddi ūr.
my horse, ewn porrnyi.
your horse, nán porrnyi.
his horse, naan porrnyi.
whose is the horse? it (i.e., the horse) *is mine,* kurna porrnyi: ewn porrnya.

my talk is true, ewn ál ágĭda.
your talk is true, nán ál ágĭda.
my dog, ewn pewrla ("*the dog is mine*" ?).
your dog, ná[n] pewrla (" „ „ „ *yours*" ?).
his (or her) dog, naan[n] pewrla (" „ „ „ *his*" ?).
a bad man, ett kábia.
a bad woman, iddi kábia.
he is bad, ón kábm.
there is (Arabic في*),* īrrum.
all of us, ádin duma (*sic*).
all of you, ung·u tuma.
one day, ū pirrki.
bring! (sing.), táni.
bring! (plur.), tániri.
bring wood! orgi tánī.
give me . . . tay.
give me eggs, eidi tay.
give him eggs, eidi tendi.
I will give you . . . na tiné.
you will give me . . . ín e tay.
I am a Mídóbi, oi Tidd enwa.
you are a Mídóbi, ín Tidd enwi.
he is a Mídóbi, on Tidd a.
we are Mídóbis, ádi Tidd aiwa.
ye are Mídóbis, ung·u Tidd aiwi.
they are Mídóbis, ung·a Tidd aiu.
I am good, oi tisinu enwa.
we are good, ádi tisina aiwa.
I ran, oi tirgéhé.
I did not run, oi tirgáhé.
I will run, oi tirgwa.
I will not run, oi tirgáwa.
I am running, oi girkăwa.
run! (sing.), tirgu.
run! (plur.), kurdik.
is the gazelle male or female? pési ayra ha arra.
is he good or bad? ón tĭsĭnha kábi (*sic*).
he is not here, ón inderri ra.
not good, tĭsĭni enná[m].
not bad, kábi enná[m].
I want, oi kollŏă.
thou wantest, īn kolloé.
he wants, ón kollém.

we want, ádi kolléwa.
ye want, ung·u kolléwi.
they want, ung·a kollém.
I do not want, oi kollowa.
thou dost not want, īn kollowé.
he does not want, ón kollám.
we do not want, ádi kollágwa.
ye do not want, ung·u kollágwi.
they do not want, ung·a kollágom.
I wanted, oi kūllăhi[m].
thou didst want, īn kūllăho[m].
he wanted, ón kullăhĭm.
we wanted, ádi kullăha.
ye wanted, ung·u kullăhwé.
they wanted, ung·a kullăha.
I did not want, oi kolláhim.
thou didst not want, īn kulláho.
he did not want, ón kulláhim.
we did not want, ádi kulláha.
ye did not want, ung·u kulláhwé.
they did not want, ung·a kulláha.
I want a piastre, *girsh kollŏă.
I do not want a piastre, *girsh kollowa.
you want a piastre, *girsh kolloé.
you do not want a piastre, *girsh kollowé.
I will come, oi īrwa.
I will go, oi usurwa, *or,* oi surwa.
come! (sing.), yi.
come! (plur.), īrī.
go! (sing.), sŏ.
go! (plur.), sŏ·i.
I am going to Bara, oi Bara ri surwa.
I go, oi surwa.
thou goest, ín surwé.
he goes, ón sūru.
let us go, ang·a sūra (a stranger is included in "us.")
we are going, ádi surgwa.
ye are going, ung·u surgé.
let us three go, ang·a tási sūra } a stranger is included in "us."
let us four go, ang·a égi sūra }
they go, ung·a sūragyu.
I went, oi sūré.
thou wentest, īn sūro.

he went, ón sūro.
we went, ádi īha.
they went, ung·a sūra.
when did ye go? ung·u ondáré īhiru.
I will not go, oi suáwa.
I did not go, oi suáhi[m].
do not come! ī rám bo.
do not go! ī surám bo, *or*, ī surám.
you did not go, īn īráho.
he did not go, ón īráhm.
I am going (*or walking*), oi sŏă.
I am coming, oi īrwa.
I have come from Bara, oi Bara ré bul īhé.
you went before (*previously*), īn ŏrré sūro.
he went before „ ón arré sūro.
I ride, oi bărăkirwa.
thou ridest, ín bărăkirwé.
he rides, ón bărăkiru.
let us ride, ang·a bărăkína (" *us* " *includes a stranger*).
ye ride, ung·u bărăkĭnĭwé.
they ride, ung·a bărăkiu.
ride thou! ín bărăki.
I see, oi kordua.
I see you, oi nai kordua, *or*, u na kordua.
you see me, ín a kordui.
I see him, u naa kordua.
he sees me, ón u kordu.
you see him, ín naa kordui.
he sees you, ón nai n kordu.
I saw, oi gultlé[m], *or*, u gultlé[m].
I did not see, oi guláhi, *or*, u guláhi.
hit the dog, pewrl gol.
I hit the man (*past*), ī gé woltlé } ī *is said to* = irr, *i.e.*, *a man or person.*
I will hit the man, ī gé wollé }
I hit (*past*), oi oltlé.
I did not hit, oi oláhé.
you hit (*past*), īn oltlo.
you did not hit, īn oláhó.
you did not hit the man, īn ekké oláhó (*sic* —*N.B.* " *a man* " *is* " ett ").
he hit, ón oltlo.
he did not hit, ón oláhm.
I will not hit, oi oláwa.
I will hit, oi olwa.

you will hit, īn olwé.
you will not hit, īn oláwé.
hit! (sing.), ol.
hit! (plur.), oli.
do not hit! (sing. and plur.), olám.
now, *hassa.
perhaps, akinningám.
outside, pálo.
inside, arré.
at once, aĭchi[n].
slowly, ilásur.
above, kandi.
behind (adv.), tung·u.
drink! tí.
I drank, oi tíhé.
I drink, oi tínáwa.
eat! ul.
I ate, oi ultlé.
I eat, oi elwa.
my country is far off, ewn *dár táséa.
my country is near, ewn *dár ŭgĕdítcha.
I die, oi tíwa.
you die, ín tíwé.
he dies, on tíu.
we die, ádi itaywa.
ye die, ung·u itaywi.
they die, ung·a ré itayu.
I died, oi tíhé.
you died, ín tího.
he died, on tíhm.
we died, ádi etáhm.
ye died, ung·u etahwé.
they died, ung·a, etahá.
Or substitute "d" for "t" throughout.
the dog and the horse, pewrl porrnyi (*no conjunction*).
the dog (together with [and also] the horse), pewrł lo porrnyi r aidi.
a man (together with [and also] a woman), iddi ro irri r aidi.
the sheikh has a cow, sirgin tur.
the "mek" has a son, sirgin kat.
before sunrise, sá·i nítchĭré.
after sunrise, sá·i barrgi.
after two years, tongŏra 'sennéddi.
another piastre, ísĭn *girshé.
behind the house, ŭ sé dé.

I will break the bowl, kósi kákíroa.
I will buy bread, urdi aiding·owa.
God made the world, Telli *dunya kyoningyé.
I descended from the gebel, ór ŭbŭl sukkĭnĭhé.
descend ! sukki[t].
open the door ! *bábi kŏso.
I will open it, u guswa.
shut the door ! *bábi tebeldĭr.
I will shut it, oi tebeldirwa.
I opened it, u gŭsĭhé.
I shut it, u tebeldiré.
why do you talk ? ín nĭ kĭnĭnelki.
why did you come ? ín indo n íhono.
good-morning ! karsŭl.
stand up ! tekkĕr.
I stand up, tekkeragwa.
I stood up, tekkeré.
I can stand up, oi *ĭgĭdĕra tekkeragwa (*—*Arabic* اقدر).
I cannot stand up, oi *ĭgĭdĕra tekkeragáwa.
I kill a dog, oi pewrl perwa.
I kill a man, oi epperwa (*for* oi ett perwa, *or*, oi irr perwa).
you kill, ín perwé.
he kills, ón peru.
we kill, ádi pergwa.
ye kill, ung·u pergwé.
they kill, ung·a pergu.
I killed a dog, oi pewrl perré.
I killed the man, oi erré perré.
you killed the man, ín erré perro.
he killed the man, ón epperro.
we killed the man, ádi 'r eppérra, *or*, anga 'r epperra.
ye killed the man, ung·u 'r epperru.
they killed the man, ung·a epperra.
seize ! arr.
I will seize, u arrwa.

AN ACCOUNT OF THE DISCOVERY AND CHARACTERS OF A HUMAN SKELETON FOUND BENEATH A STRATUM OF CHALKY BOULDER CLAY NEAR IPSWICH.

By J. Reid Moir and Arthur Keith.

[With Plate XXX.]

Preliminary.

In this paper the authors propose to give an account of the discovery and characters of a human skeleton found beneath a stratum of chalky boulder clay. In their opinion this skeleton must be assigned to an earlier stage of the Pleistocene epoch than any human remains which have so far been discovered in England. When it is mentioned that these remains of man were found embedded beneath a superficial layer of weathered chalky boulder clay only 4 feet 6 inches (1·38 metres) in thickness and that no fossil mammalian remains have been found at exactly the same level, it may be thought that the authors are somewhat rash in supposing that the human remains were *in situ* before the deposition of the stratum of chalky boulder clay. The natural supposition is to regard every human skeleton found at a depth of four or five feet from the surface as necessarily an intrusive burial made in comparatively recent times. Our reasons for regarding the Ipswich skeleton as a representative of pre-boulder-clay man are given in detail later in this paper, but here we may summarize our evidence by saying that a burial was impossible, because the line which separates the overlying deposit of boulder clay from the underlying stratum of glacial sands was unbroken. A burial, however skilfully made, if subsequent to the deposition of the chalky boulder clay, would certainly have destroyed this line. Worked flints have been found in the stratum of boulder clay which overlies the skeleton, and in the strata of mid-glacial sands which underlie it. In their opinion the condition of the bones is in keeping with the great age assigned to them. The tibia or leg bone shows characters which have not yet been observed in man—ancient or modern. Nothing was found with the skeleton: neither metal, pottery or worked flint, nor trace of burial. The skeleton lay on its right side, in an ultra flexed posture; all its parts were represented. It was, therefore, never exposed at death, or subsequently, to any disturbing force, such as flowing water or moving ice or wild beast. It will be thus apparent that the

evidence relating to the antiquity of the Ipswich skeleton rests mainly on two points: (1) the undisturbed condition of the overlying strata; and (2) the anatomical peculiarity of the tibia. It would be absurd to expect that a specimen found under such conditions will carry the conviction which is attached to one found at a great depth of undisturbed strata and side by side with abundant remnants of a past fauna, and yet it would be equally wrong to reject the discovery as untrustworthy, because it does not fulfil the canons demanded by palæontological purists. It is at least our duty to place on record all the facts connected with the Ipswich remains so that others may weigh the evidence on which we rely. Human remains which have a claim to be regarded as Pleistocene in origin must, from the nature of the case, be of rare occurrence, and it is, therefore, all the more urgent that all details connected with such finds should be placed fully on record. For the part of this paper in which the discovery of the skeleton is related and the disposition of the strata described, Mr. Moir is responsible, and for that part in which the anatomy of the remains is given, Professor Keith is responsible. In the course of their investigation the authors have become indebted to many of their friends for advice and assistance—especially to the following:—Mr. W. Whitaker, Professor John Marr, Mr. George Slater, Dr. Smith Woodward, Mr. Charles Andrews, Professor Harvey Littlejohn, Dr. Allen Sturge, Mr. Henry Miller, Mr. Hugh Candy, and Mr. Frank Woolnough.

The Discovery of the Skeleton. Mr. Moir.

About a mile to the north of Ipswich, on the estate of Mrs. W. N. Fonnereau, is situated the brickfield of Messrs. Bolton and Laughlin, which is famous to geologists for the various deposits which have been exposed by the excavation of the London clay for brickmaking. These deposits, which are given in descending order, are:—

Chalky boulder clay.
Middle glacial sand and gravel.
Decalcified red crag.
London clay.
The Woolwich and Reading beds.

This brickfield is about ten minutes' walk from my house, and for the past six years I have been in the habit of visiting it on an average three times a week, and searching for flint implements in the beds above the London clay.[1]

It will thus be seen that I have had every opportunity of making myself fully acquainted with this particular district.

Realizing the importance of finding human bones in any of the deposits from

[1] For surface view and section of the country in the vicinity of Messrs. Bolton and Laughlin's sand pit see Fig. 1; for a section across the Gipping Valley and the arrangement of the stratum of chalky boulder clay see Fig. 2.

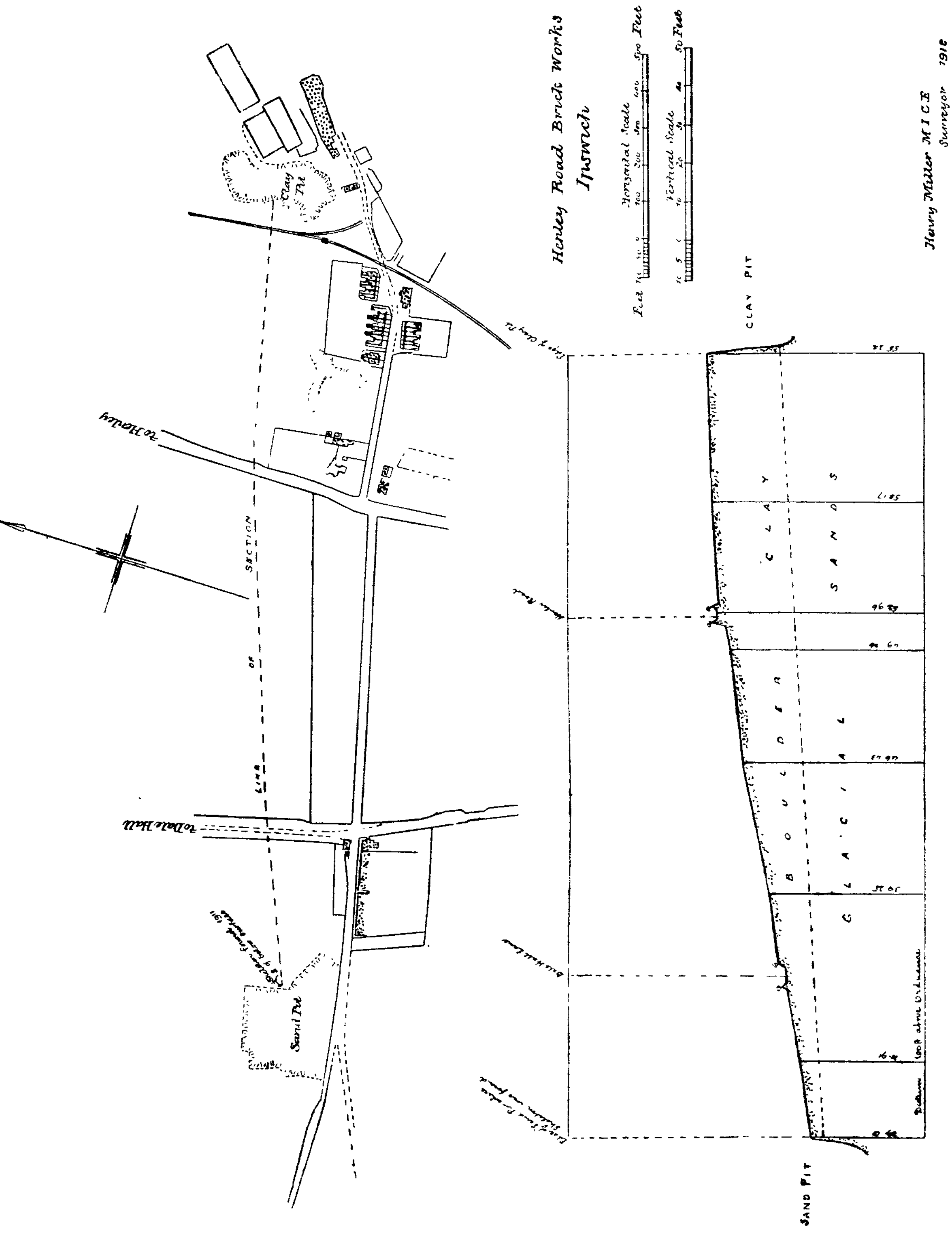


FIG. 1.—SURFACE AND SECTIONAL VIEW OF THE DISTRICT IN WHICH THE SKELETON WAS FOUND.
(Prepared for this paper by Mr. Henry Miller, M.I.C.E.)

which I have obtained implements, I have always impressed upon the workmen the necessity of keeping a sharp look-out for such remains, and of immediately communicating with me should any come to light.

On Friday, October 6th, 1911, Mr. Bolton and Mr. Laughlin, for the purpose of measuring up the amount of work done by the workmen, were in one of their pits when one of the men called out that he had found a portion of a human skull.

Mr. Laughlin went over to the spot, and giving instructions for the remains to be carefully preserved and further digging to cease, went up to his office and telephoned to me.

This was about ten minutes to two, and by two o'clock I was down at the pit, and found that a portion of a human skull, attached to an almost perfect cranial cast, and some teeth, had been recovered. It was pointed out to me that two bones were projecting from the vertical face of the section and at a depth of about four feet from the surface, but as I had to be back at my office before a quarter to three I did not stop to examine the site, but wrapping the skull fragment and cast in a piece of sacking, carried them home.

Before leaving the pit, however, I arranged for two of the workmen to meet me at two o'clock on the following day and dig out the remainder of the skeleton.

At this time it had never even crossed my mind that we were dealing with anything of great importance, and, in fact, I was quite under the impression that the bones belonged to a late interment.

Thinking, however, that my two friends Messrs. Canton and Snell, who had been associated with me in my work for some little time, would care to come with me, I telephoned to them, and they agreed to do so. I also asked Mr. Frank Woolnough, the Curator of our Museum, if he would care to go down and take some photographs of the spot where the bones were, as I knew he was anxious to get a series of interesting local views.

Before any digging commenced we had a good look at the material—a hard clay—which covered the bones, and were surprised to find that no signs of any previous digging were visible.

We therefore got the workmen to remove the overlying material with the greatest care, and kept the work under continual observation.

When the bones were reached it was found they were in a most friable condition, so I gave orders to have the surrounding material dug up in large blocks, and this was accordingly done.

When we came to examine these blocks and their contained relics my friend Mr. Canton, who is a member of the Royal College of Surgeons, strongly advised me to send them off at once to the Museum of the College, where they would be properly treated by experts.

Seeing the condition of the bones and recognizing the importance of having them attended to without delay, I at once agreed to his advice, and the same evening carefully packed the remains in a suitable box, which was forwarded to Professor Keith, the Conservator of the College Museum.

Mr. Canton, Mr. Snell, Mr. Woolnough, and myself afterwards drew up and signed a report of what we had seen when the bones were dug out. This report is as follows:—

REPORT OF MESSRS. MOIR, WOOLNOUGH, CANTON, AND SNELL.

We, the undersigned, were present at, and superintended, the digging out of the human remains found at Messrs. Bolton and Laughlin's pit, Ipswich, on Saturday, October 7th, 1911.

We all most carefully examined the section of decalcified boulder clay, under which the bones lay, before any digging commenced, and were absolutely convinced that no grave had ever been dug on the spot before.

The opinion was confirmed:

(1) By the extreme hardness of the boulder clay, which necessitated the continued use of picks in getting it up.

(2) There was not the slightest sign of any mixing of the soils (such as would occur in an old grave), the boulder clay resting normally on the underlying glacial sand, as it does in all sections known to us where the succession of the beds is the same.

(3) That in the event of a grave having been dug in the past on this spot, it is hardly conceivable that we should have dug down in exactly the same place as the original diggers, and that, therefore, one side at least of their digging would be visible in the remaining section of boulder clay.

(We invite anyone interested to visit and examine this section, when they will, we think, be convinced that no early digging has ever taken place.)

(4) The extraordinary cast of decalcified boulder clay, which completely filled the inside of the skull, we consider points to the conclusion that the clay was in a semi-fluid state at or since the time when the remains were embedded in it.[1] We think it most unlikely that the clay in its present hard condition (a condition which has apparently been present since the last great extension of the glaciers) could work its way into any skull buried in it.

(5) The bones were lying partly embedded in glacial sand and partly in decalcified boulder clay—this sand showed most plainly the lines of stratification, and was quite conformable with that underlying it.

(Signed) REID MOIR, F.G.S.
FRANK WOOLNOUGH, F.R.Met.S.
FREDERICK CANTON, M.R.C.S., L.R.C.P., L.S.A., L.D.S.
NORRIS SNELL, L.D.S.

As the question of a grave having been dug through the boulder clay had been carefully gone into by those of us who saw the bones dug out, I felt that the only thing necessary to do was to get some expert geologists to visit the section, and say exactly what the material was on each side of where the bones were found and whether it was *in situ* or redeposited.

[1] See subsequent note, p. 377.

I accordingly wired to Mr. Whitaker, F.R.S., and Dr. John E. Marr, F.R.S., and sent a note to Mr. George Slater, F.G.S., who lives in Ipswich, asking them to visit the pit with me. This they all very kindly did, and after a careful examination of the section handed in their reports, which are as follows :—

Mr. W. Whitaker's Report.

The occurrence of the human skeleton at the sand-pit, near Prospect Cottages (southward of Dale Hall), Ipswich, is difficult to explain.

The pit is worked for sand and gravel, belonging to the glacial drift, and is just where boulder clay is marked on the Geological Survey Map (48, N.W.) as coming on above the sand, etc.

Along the top of the pit, indeed the sand is in a great part capped by a brown loam or clayey sand (sometimes practically a clay) which is clearly the result of the weathering and decalcification of the boulder clay.

At the northern part of the pit there are also thin masses of boulder clay which have not been altered by weathering, and often in the loam there are lumps of boulder clay left, surrounded by the loam.

The pit reaches up to the top of the hill and is not dominated by higher ground, from which slips can have come. *There is no doubt in my mind that the pit gives a junction-section of the boulder clay with the underlying sand and gravel.*

The skeleton was found at the eastern side of the pit at this junction. The top earth was only some three feet thick, and the process of weathering has gone to such an extent, that perhaps no one seeing merely that one particular spot would say that boulder clay occurred, but there is unweathered boulder clay close by in the same sandy or loamy earth, and I can see no reason to differentiate one particular yard or so of the section from its immediate surroundings.

I could see no signs of artificial disturbance of the soil, and was told that none had been seen during the excavation. Slipping seems out of the question.

There is a remarkable thing as to the condition of the skull, which I saw at the College of Surgeons. The bony cavity is filled with earth of the same kind as that beneath which the skeleton was found, a brown loam ; and the filling is so thorough (as far as can be seen) that a cast of the cavity has been made. Now this could hardly have been done by the introduction of dry earth, the infilling material must have got into the skull in a somewhat liquid state.

I fail, however, to understand how man could have lived at the time of the commencement of the boulder clay, and I am in hopes that further excavation may throw more light on this strange occurrence. As yet we have the skeleton and nothing else.

In conclusion, I wish to say that it is well that this find fell to the hands of a man like Mr. Moir, who at once took measures to secure the remains in such a way as to leave them as much undisturbed as possible and ready for examination by skilled observers.

November 2nd, 1911. (Signed) W. Whitaker.

Professor Marr's Report.

I visited the site of the discovery of the skeleton below clay at Ipswich after the skeleton was removed, and I leave to others the proof of there having been no interment there.

My object was to discover the origin of the clay. It resembles decalcified boulder clay, and had patches of unaltered clay here and there.

It was very thin, and I should be sorry to pronounce any definite opinion about it, as my knowledge of the glacial deposits of the south-east of England is not so extensive as that which I possess of those of northern England.

I do not know how one would distinguish between boulder clay *in situ* and clay which had been derived from boulder clay at a somewhat higher level which had "flowed" as the result of being waterlogged. Such flows are often seen on beaches below boulder clay cliffs, and they strongly resemble true boulder clay.

I do not wish to suggest the clay above the skeleton had this origin, but merely that I personally am unable to distinguish a thin mass of such a clay from true boulder clay.

November 15*th*, 1911. (Signed) John E. Marr.

In another letter to me Dr. Marr says: "The material above the sand in the pit is lithologically boulder clay, which has been decalcified. All I can say is that I see no difference between the decalcified boulder clay in the higher pit, above the normal undecalcified boulder clay, and the decalcified clay above the skeleton." Also, "The slopes in the vicinity are very slight, but they may have been diminished by erosion, and I think it possible that the clay may have moved from another place. The fact that a cast of the cavity of the skull was made by clay, which seems to have been introduced in a liquid state, is, I think, in favour of this."

Mr. Slater's Report.

The pit from which the "bones" were obtained is situated a quarter of a mile west of the Henley Road, and a little to the east of the large brickyard of Messrs. Bolton and Laughlin, both pits being situated about a mile north-west of Christchurch Mansion, and bounded by the railway line on the north and the Henley and Norwich Roads on the east and west.

The sand pit is marked as such on the one-inch geological map, which also shows the junction of the middle glacial sands and the boulder clay, as occurring north of the sand pit at the time when the district was originally surveyed and the map published in 1882.

During recent years the sand pit has been worked considerably, chiefly towards the north, and is now cut back from the roadway in the form of a wide semicircle.

The floor of the pit consists of fine cross-bedded middle glacial sands upwards

of ten feet in thickness, containing intercalations of lenticular bands of clay above which, and forming the greater portion of the section, is an irregular mass of sand and gravel containing derived fossils occasionally, especially those of a durable character such as gryphoea. The gravel varies very much, both in arrangement and thickness, and maximum depth being about twenty feet.

Resting upon this sand and gravel is a band of boulder clay not more than three feet in thickness, for the most part weathered brown, but showing unmistakable patches of unweathered boulder clay, the whole thinning off on the western side of the pit.

In places infiltration has caused the junction between the boulder clay and underlying sand to be irregular, but, generally speaking, the sand immediately below the boulder clay has been protected and is highly calcareous, a small well-marked "pan" of calcareous material being well marked in places, a short distance below the junction between the boulder clay and sand.

Recently the workmen have commenced to extend the pit eastwards, in the direction of the adjoining cottages, and it was whilst so engaged that the bones were discovered.

The site where the bones were found was shown to me, October 15th, and was situated at the extreme east of the pit, about three feet below the surface, *i.e.*, from the top of the pit, immediately below the boulder clay and embedded in highly calcareous sands, a small band of the calcareous material being well marked and continuous.

As the bones had been removed and a "notch" cut down from the top of the pit to a depth of about four feet, a clear section was shown, but, of course, there was no means of ascertaining the exact condition of the material removed.

Judging from the section now exposed, this portion of the pit varies in no way from other parts of the section, and shows a clear and undisturbed section of weathered boulder clay over the calcareous sands in which the remains were found.

There is no reason to doubt that the sands and gravels are derived from glacial material, containing as they do derived jurassic material, and the boulder clay is part of the large sheet exposed so well in the neighbouring pit further to the east of Henley Road.

(Signed) George Slater.

4, *Ruskin Road,*
Ipswich.
October 21*st*, 1911.

It will, I think, be seen from these carefully compiled reports that in all its aspects this matter has been investigated in as thorough and scientific a manner as possible.

Now it appears that the main points of this discovery for consideration are :—

1. Was a grave ever dug through the boulder clay ?
2. Is the boulder clay *in situ* or redeposited ?

Regarding the first the following facts have been accumulated:—

A most careful examination of the section before the disinterment took place showed clearly that no signs of any previous digging were visible, the material in which the skeleton lay appearing *to be in every way the same* in its stratification as that which extended for some distance on each side of it (see Figs. 11, 12, 13). There was not the slightest mixing of the soils apparent such as is now to be seen where the hole dug has been filled in. I am fully alive to the fact that by the action of roots and by the percolation of rainwater all traces of disturbance or digging in a surface stratum are soon removed, but when such traces are removed the old lines of stratification cannot be reformed. No grave furniture was found with the body such as usually occurs in burials of many subsequent periods. Immediately underneath the bones a pronounced calcareous band was present, this deposit, which is often found in sand underlying boulder clay and which gives a marked effervescence with HCl is much in evidence in this pit and extends more or less continuously on either side of the spot where the remains were found. If a grave had been dug through the boulder clay the rainwater, percolating through the loose material filling the grave, would have dissolved away this calcareous deposit.

The skeleton was lying partly embedded in glacial sand and partly in boulder clay. This sand showed clearly lines of stratification and was conformable with that underlying it. This could not be the case if a grave had been dug down through the clay and into the sand.

The cranial cavity was completely filled with a red sandy loam exactly the same in composition as the stratum in which the skull lay. The cranial cast contained neither more nor less chalk than the surrounding stratum. At first it was supposed that, in order to obtain so complete a filling of the skull, the material must have been at one time in a semi-fluid condition. We have since discovered that skulls do become completely filled when buried in a dry soil. The manner in which the solid material works within the skull is obscure; all we are certain of is that the solid cranial cast may have been formed without the surrounding matrix having been in a semi-fluid condition.

On Wednesday, February 7th, 1912, being anxious to get a good photograph of the hole we had filled in after removing the skeleton, I went down to the pit and cleared away the material under and on each side of our digging.

When this was done the striking difference between the material filling the hole and that surrounding it was very manifest, as the former was an indiscriminate mixture of surface humus, boulder clay, and glacial sand, while the other showed first hard undisturbed boulder clay underlain by clean, stratified glacial sand.

Now I have no hesitation in saying that if ever a grave had been dug on this spot before, the inevitable mixing of the soils would have remained visible, and no period of time would ever convert the material which now fills the hole we dug into first hard clay and then fine chalky sand, as was present before the bones were dug up. Also, apart from this evidence, it is as well to mention that, about 100 yards to

the west of where the remains were found, the middle glacial sands come up to the surface, and that, as this is so, it is difficult to imagine that any Neolithic or other people would take the trouble to dig a grave through hard clay when soft, easily dug sand occurred close at hand. Therefore, I think, we can quite put aside any idea of a late interment.

The occurrence of such easily destroyed things as human bones under a stratum, which was deposited by an ice sheet, is at first sight rather remarkable, but my opinion is that the body of this man was covered by some depth of sand before the boulder clay was deposited. Even if the sand were only a few feet in thickness it would be sufficient to protect completely the bones from any pressure which might be brought to bear upon them. It must be remembered, too, that the erosive power of ice is very variable, as sometimes it passes over a surface of incoherent sand without disturbing it at all.

Our contention is that there was in inter-glacial times a sandy land surface to the north of Ipswich where these remains were found, and that this man died on that land surface and was covered up by the sand. This surface was afterwards buried by the chalky boulder clay. If our contention is correct then the material composing the cranial cast should be the same as that found beneath boulder clay elsewhere.

Realizing this, Professor Keith has made an analysis of some of the material of the cast, and some which I sent him from below fifteen feet of chalky boulder clay at a pit about half-a-mile distant from where the bones were found.

This analysis shows that the cranial cast is composed of 70 per cent. of very fine sand, blackish, a few fine grains of chalk, and some black specks and 30 per cent. fine chalky grey sediment. The sand from beneath the boulder clay showed 45 per cent. fine grains of sand, many small black specks, a few fine grains of chalk, 55 per cent. fine chalky grey sediment. It will be noticed that the difference is one of degree only, and there appears no doubt that both are one and the same formation.

These black specks in the sand under the boulder clay are peculiar and may have been formed by the roots of plants when the top of the sand was a land surface.

Mr. Hugh Candy has examined this black material and finds that it is composed of 37 per cent. of organic material and moisture with 63 per cent. of ferruginous sand. The black substance is evidently a vegetable derivative.

There also seems no doubt that when the boulder clay was first deposited there was a very much greater thickness of it at this spot than is seen now. The melting of the ice-sheet which laid it down would cause a lot of denudation, and during the ages which have passed since the ice finally disappeared the same process has been continually going on.

It may be asked whether we have found other bones on the same horizon as the skeleton, and we must confess that up to the present we have not done so. But at Leiston—in a deposit which underlies chalky boulder clay, and which I look

upon as middle glacial—a large tusk of an elephant and other bones have been discovered. A metatarsal bone of a deer from this deposit shows the same condition of preservation as the bones of the human skeleton. I think also that a proper search of these deposits will result in more bones being found, and other evidence to prove that the top of the middle glacial sands and gravels was a land surface in pre-chalky boulder clay times.

Now if this man was lying on this glacial sand, and was covered by the boulder clay, we can be sure that as the clay became decalcified the human bones would also disappear by the same process. This is exactly what has happened. The skeleton was found lying partly embedded in glacial sand and partly in boulder clay. The portions in the sand have been fairly well preserved while those in the clay have almost entirely disappeared. The grains of chalk in the mid-glacial sands are stained to exactly the same depth as the human bones, and it is quite evident that both have been subjected to the same conditions. This seems to me to be conclusive evidence that this man was lying in the sand before the clay was deposited, and that the processes which since then have affected the clay have also in exactly the same way affected the bones.

There is no doubt that as the overlying clay got removed by denudation, roots from the surface would find their way down to the bones and help in their destruction. This is no doubt what happened, as we have found that some roots have passed right down through the skeleton into the underlying glacial sand and into the cranial cast. The calcareous band which has been mentioned as occurring

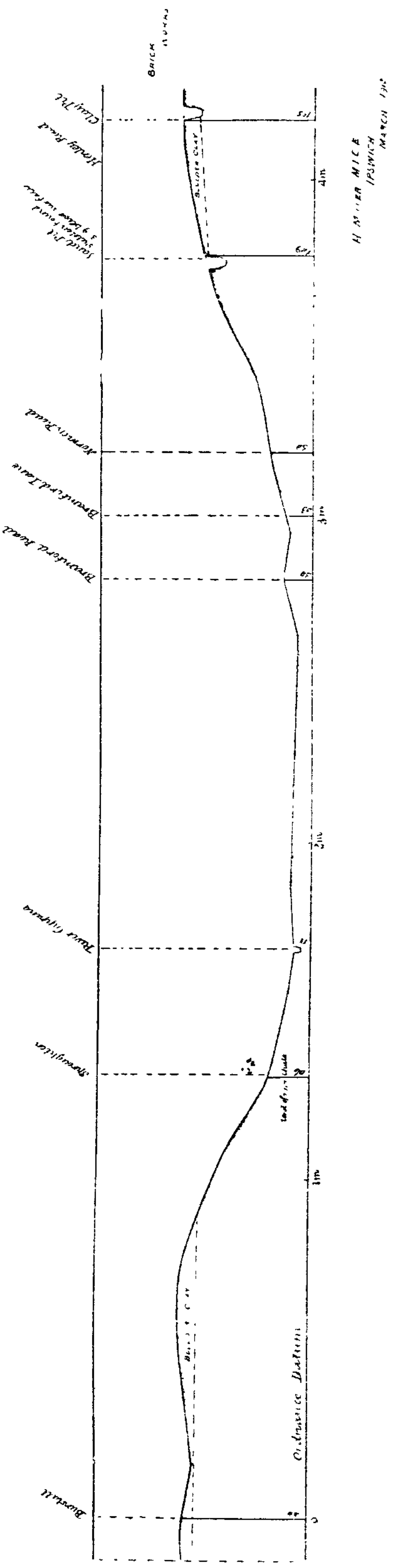


FIG. 2.—SECTION ACROSS THE VALLEY OF THE GIPPING, SHOWING THE POSITION OF THE CHALKY BOULDER CLAY AND THE POINT AT WHICH THE SKELETON WAS FOUND.

under the bones is full of rootlets, and as these do not go deeper it appears that they were feeding on this chalky layer.

The discovery of a human skeleton below the chalky boulder clay did not come as a great surprise to me, because for some long time past I have been finding well-worked flint implements in the clay and at the junction of the clay with the glacial sand; I have found some implements within ten yards of where the bones were found and at exactly the same horizon. These implements are unpatinated and in many cases as sharp as the day they were made. This fact shows, I think, that the ice-sheet which deposited the boulder clay was moving over a land surface on which these implements were lying, and some of them consequently got incorporated into its bottom moraine. Thus, having found the implements, we have by great good fortune found one of the men who made them. The worked flints discovered are of pre-palæolithic forms, and have been identified by Dr. Rutot of Brussels, as his pre-Strépy type. As no true palæoliths have ever been found in the boulder clay or the gravels underlying it, we may conclude that these deposits pre-date the palæolithic gravels in this part of the country. The true palæolithic implements are found in totally different deposits, which, as usual, occur as river terraces, and are of a much less ancient date than the glacial deposits.

This fact leads up to a consideration whether the Gipping Valley was eroded in post chalky boulder clay times (section of valley, see Fig. 2), and while I am not sufficiently acquainted with the geological facts to speak definitely on this point, yet it seems to me highly probable that such was the case. The geological map certainly shows boulder clay on each side of the valley at a high level, but none down in the Valley itself. Also Mr. Whitaker, writing to me on this matter, says: "I've always looked at the Gipping Valley in common with others, as eroded in post-glacial times. In it, as in others, there may be places where an older channel (glacial or pre-glacial) may be cut across, or followed. That the whole valley is pre-glacial is another matter, and I don't agree with that view. The glacial drift has certainly gone across from side to side, but for the most part not in a hollow.

"The present valley has been cut through this drift."

But whether the whole valley is post-glacial or not, it is nevertheless certain that a very large portion of it has been completely eroded since the deposition of the chalky boulder clay.

We can now proceed to discuss the second question: "Is the boulder clay *in situ* or redeposited."

A little less than half-a-mile to the east of where the skeleton was found is a pit showing an 18-foot section of chalky boulder clay which is undeniably *in situ*. Realizing the importance of ascertaining whether the boulder clay above the human bones was continuous with that in the other pit mentioned, I asked for and received permission to dig small pits in the fields separating the two pits. These excavations resulted in establishing the fact that the clay *is* continuous.

The northern face of the pit under discussion shows for some little distance totally undecalcified boulder clay underlain by the same stratified calcareous glacial sand in which the human skeleton occurred. But on the east side, where the bones were found, the clay is mostly decalcified, though unchanged patches occur here and there. These patches, which sometimes contain the usual derived fossils found in chalky boulder clay, merge imperceptibly into the surrounding decalcified portions, and they are without any doubt the same formation. The decalcification proceeds by means of pipes as in the chalk, but why exactly this should be so is rather mysterious. There is no doubt, however, that the cause of the decalcification is the proximity of the clay to the surface, where it is exposed to all the decalcifying agents, and in the deeper section mentioned the same condition is apparent, that is, the uppermost portion of the clay is partly decalcified. The lower portions, which are further away from surface conditions, have remained unchanged. We have been able to make decalcified boulder clay artificially, by subjecting some of the unchanged clay to the action of dilute HCl and water. This dissolved out the chalk, and we afterwards stained the remaining material with water impregnated with iron. When this is compared with samples from the two pits it is at once seen they are all exactly the same and therefore there can be no doubt that the skeleton was lying under decalcified boulder clay. The evidence against the boulder clay being *in situ* takes the form of the opinion expressed by Dr. Marr that at some period it may have got waterlogged and consequently caused to "flow." Dr. Marr's opinion is that the slopes in the vicinity of where the skeleton was found are sufficient to allow of such a "flow" taking place, and also that higher ground may have at one time existed which has since been removed by denudation. He also suggests that such a liquid condition of the boulder clay, as must necessarily have been present if it ever "flowed," would account for the complete infilling of the skull of the skeleton discovered. Now the spot where the skeleton was found is up on the plateau and is bounded on the north and south by two small valleys, and on the west at some distance by the Gipping Valley. These two small valleys were apparently excavated at the same time as the major valley was made.

It is therefore obvious that the only direction from which a "flow" could have come was from the east.

As I was very anxious to get an absolutely accurate knowledge of the O.D. levels, I asked Mr. Henry Miller, M.I.C.E., Civil Engineer and County Surveyor for East Suffolk, if he would take them for me, and he very kindly consented to do so. (See Fig. 1.) It is owing to his goodness that I am able to reproduce the admirable cross-section given in Fig. 2, which shows the exact slope of the ground from the highest point of the plateau to the east, to the spot where the skeleton was found. We found that the bones rested at about 125 O.D., and that the land surface above them is 129·01 O.D. The other pit, where the boulder clay is 15·18 feet thick, is situated just under half-a-mile to the east, and at the highest point in that direction. This point lies at 155·24 so that we have a fall

of only 26 feet in about half-a-mile, not a very serious matter, nor at all calculated to accelerate any flow, even if the clay was ever sufficiently waterlogged to allow of it. We find that the top of the middle glacial sand, where the bones were found, is only 10 feet lower than the corresponding level in the more easterly pit.

But apart from the difficulty of believing that a slope of 10 feet in about half-a-mile of a surface of sand is sufficient to allow of a "flow" of boulder clay, we have, so far, no evidence that such a "flow," and the conditions giving rise to it, ever existed. In fact, the evidence appears to be in antagonism to such a theory. In the first place the sand underlying the clay in the pit where the bones were found *is highly calcareous,* and it seems certain that such a condition could not possibly be present if at any time the clay had been removed and other deposited, because the water which would accompany any such phenomena would dissolve out the chalk from the underlying sand.

Also it is presumed that the stones in the clay above the bones would lie with their longer axes along the line of movement if the clay had ever moved in the manner suggested. This is certainly not the case as they rest at all angles in the clay. I therefore submit that the material under which the bones were lying is the undisturbed, though eroded and partly decalcified, base of the chalky boulder clay formation. The discovery of this human skeleton and flint implements on the surface of the middle glacial sand below chalky boulder clay brings up some very interesting points for discussion. In the first place it appears certain if our conclusions are correct, that the ice which deposited the boulder clay was advancing over a *land surface,* and was not associated with a period of submergence, as some have supposed. The sharpness and complete absence of patina on so many of the flint implements found on the same horizon as the skeleton, in the overlying clay and in boulder clay elsewhere, seem to make it certain that the land-ice theory must be the correct one. If we had only found the implements the evidence would not be so strong, but having found the bones of one of the men who apparently made them, the case is altogether different and the cumulative evidence overwhelming.

The chalky boulder clay under which this skeleton was found was the result of the last extension of the glaciers of what is known as the Great Ice Age, and is undoubtedly of a very great antiquity. Since its deposition most of our river valleys have been excavated and all the palæolithic and other prehistoric races lived and disappeared.

The antiquity of the chalky boulder clay has been brought home to me by a letter I received the other day from Mr. Whitaker, in which he states that at Upminster in Essex the 100-foot terrace of the Thames rests upon and is therefore less ancient than this formation. Those of you who are familiar with the Thames Valley will know better than I do what this means, but I have seen this 100-foot terrace and examined large series of the palæolithic implements found in it.

When it is realized how very ancient these things must be, and that this human skeleton found at Ipswich occurred under a glacial deposit older than any of

the river terrace gravels, it is perhaps possible to form some faint idea of the lapse of time which separates us from the days when pre-boulder clay man lived in East Anglia.

Description of the Skeletal Remains.—Professor Keith.

When the blocks containing the skeletal remains from Ipswich arrived at the Museum of the Royal College of Surgeons it was found that the bones were so fragile that it was necessary to steep each block in a solution of gelatine. In all the blocks two sharply contrasted strata were seen, the upper part of each being composed of weathered chalky boulder clay, the lower of a red glacial sand. The various fragments of bone were exposed on the surface of each block by laboriously removing the matrix of boulder clay, thus leaving the bones embedded *in situ* on the underlying sandy part of each block. It soon became apparent that there was a representation of a complete skeleton, and that while those parts which lay in the glacial sand were fairly perfect, the other parts, lying in the weathered boulder clay—which had the appearance of a red clay loam with a considerable proportion of chalk in it—had mostly disappeared. The dense bone of a shaft might be made out in an eroded condition, but as the shaft was followed to its ends, where the cancellous tissue replaces the dense bone, it became impossible to distinguish the outline, so gradually did the clay-impregnated bone fade into the surrounding matrix.

Position of the Skeleton.

It was a most fortunate circumstance that the remains of the skeleton were preserved *in situ* on the blocks, for by placing these together—at first a task with something of the nature of a Chinese puzzle in it—the posture and position of the skeleton became apparent. The photograph (Plate XXX, Fig. 2) shows these blocks assorted, as regards position, and the sketch prepared from the block, with missing parts represented by stippled lines, will show both the posture of the skeleton and the parts preserved (Fig. 3). The parts preserved belong chiefly to the right side—the side embedded in the glacial sands; practically all the cancellous bone has disappeared, the only parts preserved being the carpal bones of the right hand and part of the head of the right femur and corresponding acetabulum. The sternum, spinal column, base of the skull, foot bones and extremities of the long bones were eroded away, and if visible they were inseparable from the surrounding matrix. The skull and cranial cast, some teeth with fragments of the upper and lower jaw had been already detached from the matrix when received. It will be seen that the skeleton rests on its right side with the thighs flexed on the body and the legs on the thighs. The right hand rests beneath the right tibia and the right elbow lies under the remains of the right ribs. The left elbow acutely flexed lay over the right but under the left thigh bone; the left hand was flexed and lay under the upper end of the left humerus. In the drawing (Fig. 3) the head is shown

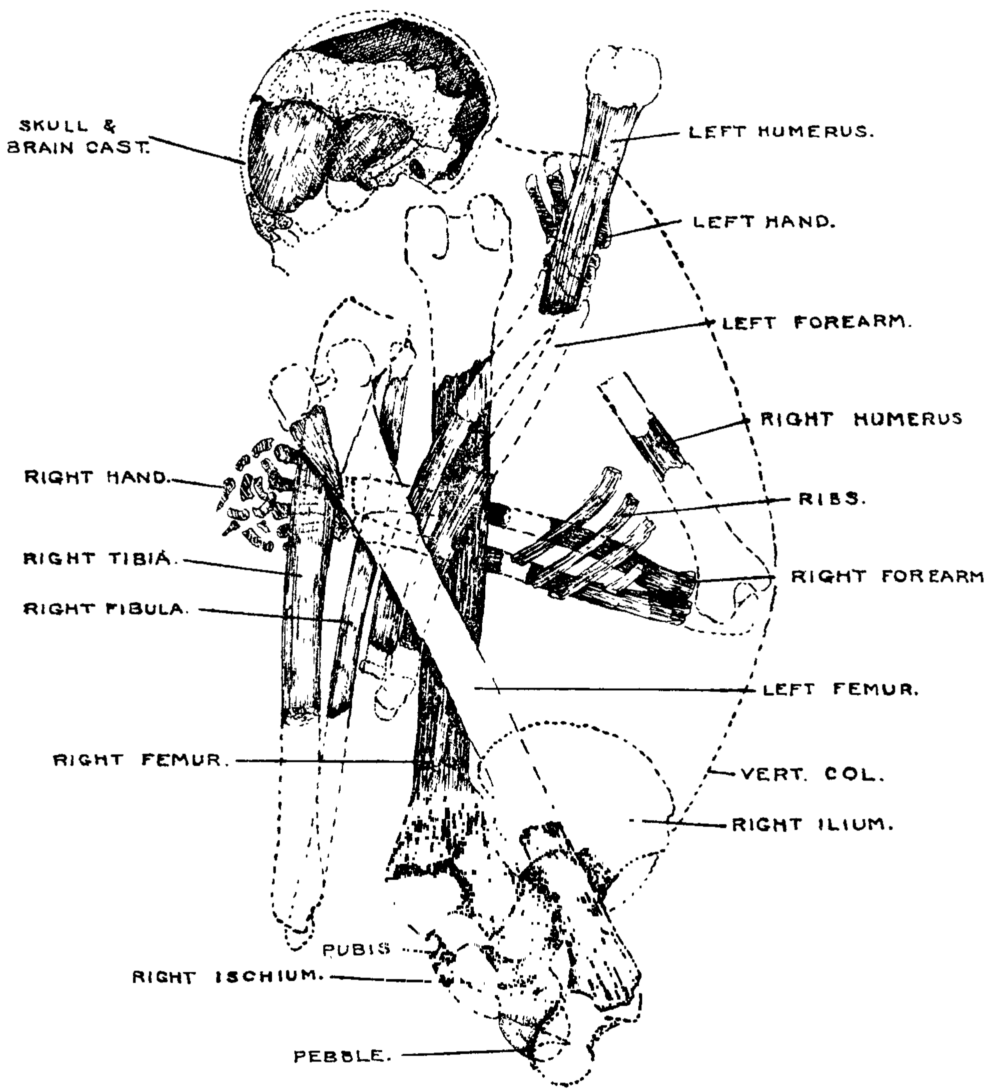


FIG. 3.—SKETCH OF THE SKELETAL REMAINS SHOWING THE PARTS PRESERVED (SHADED) AND THE POSTURE OF THE BODY. (Approximately one-fifth natural size.)

on its right side between the left humerus and distal end of the right femur. That this was its position is inferred from the fact that when the workmen first exposed the skull on the vertical face of the pit, two bones projected, one on each side of it. There can be little doubt that one of these was the distal end of the right femur, the other the proximal end of the left humerus. Whether the skull lay on its right side or was turned face upwards we cannot now tell. We know for certain the head was directed towards the south-west. The bones lie directly on the glacial sands; under the pelvis was an oval pebble, about 60 mm. long, of the same nature as occurs in the lower stratum of the boulder clay. The position of the bones recalls at once the posture of the body in Neolithic burials and of Bronze Age burials; the contracted posture is not unknown in burials of the Palæolithic period.

At first I regarded the extreme degree of flexure of limbs as a certain sign of the body having been buried—at whatever period of time burial may have taken place—but on consulting Professor Harvey Littlejohn, who has a wide experience of the posture which a body may assume at and after death, I definitely abandoned the idea that extreme flexure of the limbs was a certain evidence of burial. A person dying in a crouching or squatting posture retains that posture after death.

The Chemical and Physical Condition of the Bones.

A circumstance which at first made me sceptical of the antiquity ascribed to the skeleton by Mr. Moir was the condition of the bones. They are extremely light. They cannot, in any sense of the term, be described as mineralized. Their colour is a reddish brown, but when fractured, the freshly made surface is seen to be of the colour and consistence of chalk; the reddish tinge has penetrated only the surface layer of the bone, seldom reaching a greater depth than ·5 mm., although here and there the surface lamella to an extent of ·2 mm. may be stained red. The chalk granules in the sand are stained to a similar depth. The diplœic spaces of the bone are reddish in colour and contain fine granules of sand. In the case of the limb bones the medullary cavities and cancellous spaces are completely filled with reddish-brown loam. It is well known that the chemical composition of bones is not a safe guide to their antiquity. Mr. Hugh Candy was good enough to make an analysis of three parts of the skeleton, and the following are the results:—

	Specimen		
	i.	ii.	iii.
Organic matter and moisture	19	11	14
Calcium phosphate ...	46	70	77
Calcium carbonate ...	7	8	4
Iron oxide, etc. ...	28	11	5
	100	100	100

It will be seen that parts of the same skeleton yield a considerable variation in composition; specimen 1, which contains 28 per cent. of iron oxide, may be described as fossilized. The proportion of organic matter has been used as a test. In recent bone this element forms 30 to 33 per cent. of the total weight. In the Ipswich skeleton 10 to 19 per cent. of the organic constituents of the bone have disappeared; the proportion of the calcium carbonate has diminished; in recent bone it stands

to the phosphates as 1: 5 to 8. In 1863 the Moulin Quignon mandible and another found in a coprolite pit at Foxhall, near Ipswich, and probably derived from the mid-glacial sands, were rejected by a body of experts because they contained 8 per cent. of organic matter, and did not show the degree of mineralization which was expected from human remains derived from strata of a mid-Quaternary Age. There are now in the Museum of the Royal College of Surgeons a series of preparations, made by Hunter about 1790—120 years ago—to show that fossils may retain a very large percentage of their organic matter. In the tooth of the mastodon he found 30 per cent. of organic matter. Gimbernat, the anatomist, prepared a jelly from the bones of the mammoth. A short time ago I had submitted to me a human skull found in a cave with the remains of Pleistocene mammals. The human skull was perfectly fresh in texture; it was not until the discoverer showed me that the bones of the reindeer and the rhinoceros found in the same cave were in a similarly fresh condition that I was convinced that the skull was probably of the same age as the other animals.

It will be thus seen that the percentage of organic matter and the degree of mineralization are very uncertain criteria of antiquity. I note that the Engis cranium is being rejected because of its light weight and modern appearance, and yet Schmerling found it at a depth of five feet in the bone breccia of a cave containing remains of the mammoth and woolly rhinoceros. The same objection has been made to the human remains found in Quaternary or Pliocene strata at Olmo and at Castenedolo in the north of Italy. It seems possible that human bones are not affected in quite the same way as those of the greater and smaller mammals when embedded in ancient strata. In the present case we have only two specimens for comparison. One is the metatarsal of a large form of deer from the mid-glacial sands at Leiston. That specimen is light, and shows a degree of fossilization comparable with the Ipswich skeleton. The other specimen is the basal part of the antler of a large deer (*Cervus elaphus*) found at a depth of twenty feet in the glacial sands. In this case the bone is completely mineralized and heavy, quite different from the Ipswich bones. It is possible that in the case of the deer's antler it may have been derived from erosion of the red crag. Thus, in my opinion, the condition of the Ipswich bones is not incompatible with the age ascribed to them by Mr. Reid Moir.

I carried out the following tests:—I placed in separate bottles, filled with a 5 per cent. solution of HCl fragments of the following bones: (1) part of a rib from beneath the red crag; (2) part of a rhinoceros bone found in brick earth (but probably derived from an older formation); (3) fragments of the Ipswich skeleton; (4) fragments of various human crania of various ages, ranging from Quaternary date to the Neolithic period. In specimens 1 and 2 the specimens gradually crumbled away in the acid, so that all that was left was a red sediment which settled in the bottle. In all the others, with the exception of the Ipswich skeleton, the calcium salts and mineral matter were slowly extracted, leaving the original specimen represented by its organic or gelatinous basis. In the case of

the Ipswich specimens, the bone crumbled away leaving no organic basis behind; the sediment was more floccular and in larger masses than in the Pleistocene bones, but its reaction was similar in nature. So far as this rough test may serve it indicates the antiquity we suggest for the Ipswich skeleton.

Age, Sex, Stature.

The skeleton is fragmentary yet the evidence is sufficient—founded on the characters of the skull and of the limb bones—to leave no doubt that we are dealing with the skeleton of a man. The femur was approximately 500 mm. in length, the tibia about 400, from which one estimates that in life he must have had a stature of about 1,800 (5 ft. 10 in.)—or, if we use Pearson's formula (*Phil. Trans.*, 1898, Series A, Vol. 192, p. 196), 1750 mm. (5 ft. 9 in.). The first molar teeth are worn so that the dentine is exposed on the whole area of the crown; the wisdom teeth and lower incisor are slightly worn; the sutures of the skull are still unclosed. From these circumstances I infer that he was a young adult—probably between 30 to 40 years of age.

Racial Characters.

On receiving the Ipswich bones, I at once sought for those parts which characterize Neanderthal man—the supraorbital ridges, the contour and thickness of the skull bones, the teeth, the temporo-maxillary joint, the mastoid process, and it was at once apparent that all the features of Neanderthal man were absent, and that in most points the Ipswich skeleton differed very little from the present-day type of man.

Cranial Characters.

A photograph of the right side of the skull will give the reader a fair conception of the material at our disposal for a reproduction of the head form (Plate XXX, Fig. 1). The right half of the cranial cast is almost complete, only a fragment is lost over the anterior end of the third frontal convolution and a little has been lost from the region of the lambda. The imperfect condition of the left half of the cast will be apparent from the exact drawings given in Figs. 4, 5, and 6. It will be also seen that part of the cranial cast has also been broken away from the highest part of the cranial vault. Sufficient, however, remains to form a fairly reliable basis for the original head form of the individual. There is no reason to suppose the cast has been distorted by compression, although on the upper part of the frontal bone there is a distinct depression caused by pressure on the cast. The photograph (Plate XXX, Fig. 1) shows traces of root action. Rootlets had made their way through the coronal suture and into the interior of the skull. The rootlets had expanded into roots of very considerable size, as may be seen from the diameters of the perforations at the coronal suture and the wide tracks left on the surface of the cranial cast. (In Plate XXX, Fig. 1 these root tracks are exposed on the frontal lobe.) The total length of the cranial cast—from frontal

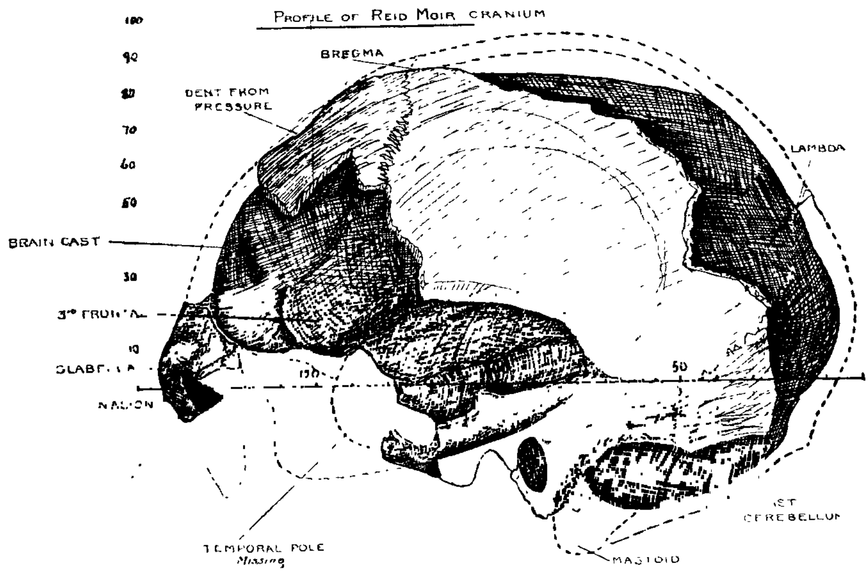


FIG. 4.—PROFILE DRAWING OF THE SKULL.
The various parts of the skull and brain cast have been transposed in the drawing from the right to the left side (one-half natural size).

to occipital pole (Fig. 4)—is 173 mm.[1] The part of the supra-occipital over the occipital poles is not preserved, but, judging from the lateral part, it was not more than 4 mm. thick. Over the frontal pole, in the region of the ophryon, the frontal bone is 8 mm. thick. Above the nasion and in the region of the glabella the frontal bone has a thickness of 19 mm., but when the frontal fragment is in position (Fig. 4) the glabella is seen to project only 15 mm. in front of the brain cast. Thus the maximum length of the head was approximately 192 mm.—made up of 173, brain cast; 4, occipital thickness; 15, frontal thickness. The analysis of the antero-posterior diameter of the heads shows no striking departure from the modern form ; the glabella is 3 or 4 mm. more projecting than is common in modern British skulls. As regards width of head, the estimate has to be based on the measurements made of the right half. The greatest transverse diameter of the right half is 72 mm., 4 mm. of this measurement being due to the thickness of the lower part of the parietal bone. The maximum transverse width of the skull was thus approximately 144 mm., the width of the cranial cast 136 mm. The position of the maximum diameter of width is somewhat important. In skulls of the Neanderthal type it is situated nearer the occipital poles than in modern skulls. In the Ipswich skull the maximum diameter is situated between 55 and 65 mm. in front of the occipital end (see Fig. 6); in modern crania of the same size it is usually situated 10 mm. further forwards. The correct localization of the point of maximum width depends, in the present case, on the accuracy with which the mid point has been fixed at

[1] The measurement was made ten days after the bones arrived at the Museum. When measured two months later the cast had shrunk to 166 mm.

the posterior pole of the cranial cast (see Fig. 6). If I have made an error in fixing that point too much to the left, then the result would be to alter the position of the maximum width of the skull. I do not think an error has been made and believe that the posterior position of maximum diameter is an intrinsic character of the skull. In the drawing showing a coronal section of the skull (Fig. 5) the maximum transverse diameter is seen to be situated between 40 and 50 mm. above the ear holes; in typical Neanderthal crania it is situated much lower down. Thus as regards maximum length (192 mm.) and maximum width (144 mm.) the Ipswich skull agrees very closely with cranial forms abundantly represented now in England. The proportion of width to length is 75 per cent.

In estimating the height of the skull certain difficulties are met. The median vault of the skull, on each side of the longitudinal sinus, has disappeared from a point in front of the bregma to the region of the inion. Unfortunately, too, the part of the cranial cast which occupies the highest part of the vault (see Figs. 4 and 6) is

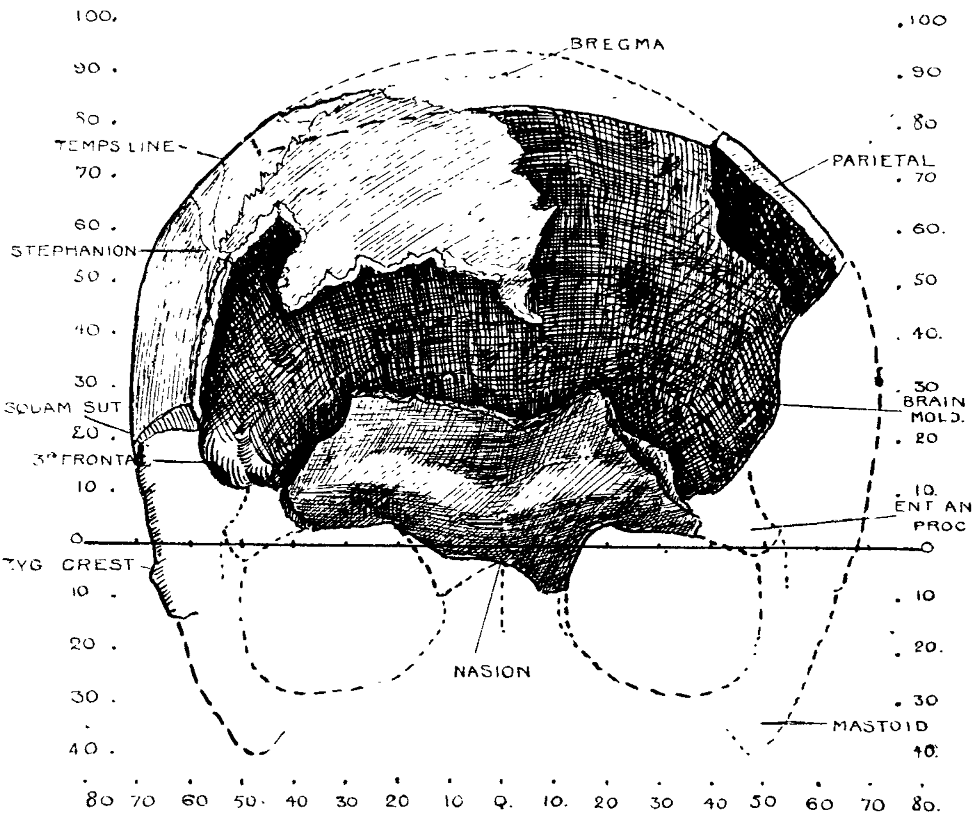


FIG. 5.—FULL-FACE DRAWING OF THE SKULL ORIENTED AS IN FIG. 8.
(Scale of reduction is indicated.)

missing. Still the vault of the skull can be restored to approximately its original form. The contour of the frontal-parietal bones and the coronal suture of the left side guide one to the position of the bregma (see Figs. 4 and 5); this is situated 90 mm. above the plane (sub-cerebral)[1] on which the skull is oriented in Fig. 4; it

[1] Sub-cerebral plane. See Keith, *Jour. Anat. and Physiol.*, 1910, vol. xliv, p. 251.

is situated 120 mm. in front of the occipital pole of the skull. In human crania the highest point of the vault of the skull is situated about 40 to 50 mm. behind the bregma and from 6 to 10 mm. higher than the bregma. In the present instance, judging from the contour of the right parietal bone and of the brain cast, the highest point was situated not more than 6 mm. above the bregma—very probably it was a little less. The brain cast and the fragment of the lambdoidal suture serve to locate the position of the lambda; it is placed 50 mm. above and 12 mm. in front of the occipital pole—a position which is usual in modern crania of a mescocephalic shape. The highest point of the vault is thus about 96 mm. above the sub-cerebral plane and 111 mm. above the upper margin of the ear holes. It will be thus seen that it is a low skull; in modern British crania it is usual to find that the highest point is between 100 and 105 mm. above the sub-cerebral plane and 120 to 125 mm. above the upper margin of the auditory meatus. At the same time it must be noted that equally low skulls are observed amongst the modern British. Using Pearson's formula ($L \times W \times H \times \cdot 000337 + 406$) we obtain a cranial capacity of 1,430 c.c., about 50 c.c. below the average for modern Englishmen.

Characters of the Forehead.

In Plate XXX, Fig. 1, the supra-orbital part of the frontal bone is represented below the cranial cast; in the drawings it is placed in position over the cranial cast.

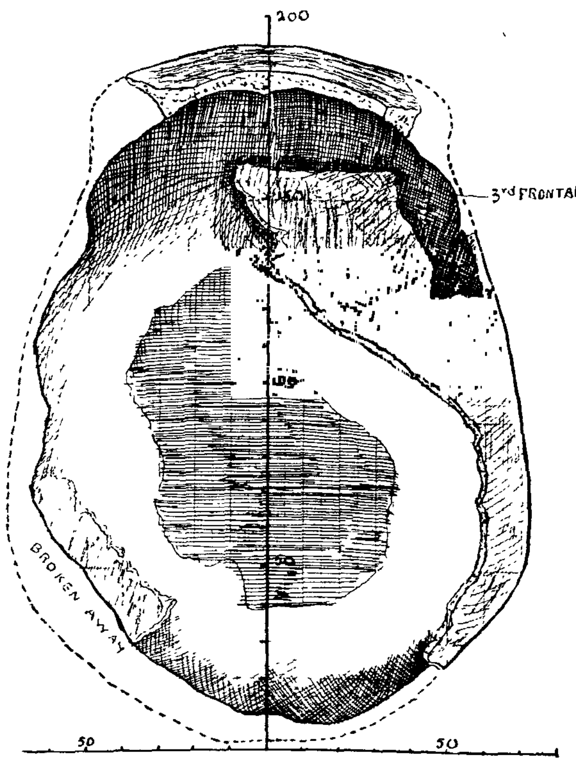


FIG. 6.—VERTEX VIEW OF THE SKULL.
The deficiencies on the vertex and left side of the brain cast are indicated. (The degree of reduction is indicated by the scale.)

The supra-orbital fragment includes the region of the nasion, glabella and ophryon and measures 25 mm. in its sagittal direction. It is 82 mm. wide and includes the supra-orbital and supra-ciliary regions, but the external angular processes are broken away. It is at once seen that there is no *torus supra-orbitalis* (Schwalbe) such as seen in Neanderthal man. The supra-ciliary eminences fuse in a slightly hollowed glabellar eminence; they are distinctly separated from the supra-orbital ridges. There is no supra-nasal recess; the nasion is in almost the same vertical plane as the glabella (see Fig. 4). The intra-orbital width is 25 mm.—a modern amount. The distance between the inner margins of the supra-orbital notches is 34 mm.; between their outer margins 48 mm. From the width of the frontal lobes of the cranial casts, the position of the stephanion and the contour of the supra-orbital parts of the frontal fragments, it is estimated that the width of the frontal bone between the fronto-malar processes was not more than 106 mm. while the width between the temporal lines, at the level of the ophryon, was between 96 and 98 mm. In all the features the Ipswich skull agrees with crania of the modern British type. The forehead, however, was more receding and the glabella more prominent than is now common. The frontal sinuses are small; they are confined to the region of the supra-ciliary eminences. The sinuses ascend 20 mm. above the nasion, extend outwards to 15 mm. on each side of the middle line and at their greatest have an anteroposterior diameter of 15 mm.

Thickness of the Cranial Bones.

It is well known that crania of the Neanderthal type are characterized by the thickness of their cranial walls—10 to 12 mm. being a usual measurement in the region of the vault. The cranial vault in the Ipswich skull is thin. Nowhere is the parietal bone more than 5 mm. thick, the frontal bone varies from 4 to 5 mm.; in the midline at the region of the glabella and nasion its measures 19 mm.; at the ophryon 8 mm.

The Temporo-Maxillary and Mastoid Regions.

These are represented in Fig. 4 by accurate tracings in profile. It is at once seen that the articular eminence and glenoid cavity are of the form seen in human crania of the modern type, and altogether different to these parts in Neanderthal man. The articular eminence is high, the glenoid cavity deep (10 mm. above the level of the articular eminence). The post glenoid is especially strong. The tympanic plate is placed vertically, as in modern crania, and is deep—very different to the anthropoid form of tympanic plate seen in Neanderthal man. The mastoid processes are broken, but the parts which remain show that they were of the prominent pyramidal form. The region of the inion is absent, but below the asterion a weak muscular impression (superior curved line) marks the attachment of the muscles of the neck, and indicates for us that in the attachment of the head to the neck the Ipswich man was altogether modern and not Neanderthal in his characters. The full prominent cast of the cerebellum also confirms this inference.

Characters of the Face.

Very little can be said about the face. The nose sprang almost straight from the forehead, there being no nasal notch. The forehead receded. The root of one zygomatic arch is present; the bizygomatic width is estimated to have been 135 to 136 mm., indicating a wide face. The muscles were certainly not greatly developed, for the temporal lines are indistinctly marked and do not rise higher on the vault of the skull than in modern man. The stephanion is 67 mm. from the bregma when measured along the coronal suture: the inter-stephanic diameter was about 110 mm. The temporal line (muscular) ascended to within 70 mm. of the sagittal suture.

The Brain Cast.

The measurements have been already given, and the cranial capacity estimated at 1,430 c.c. The low, wide, squat form of brain certainly recalls the form of brain cast seen in Neanderthal man. As may be seen from the drawings (Figs. 4 and 5), and especially the photograph (Plate XXX, Fig. 1), certain of the cerebral convolutions are very plainly indicated. This is especially the case as regards the third or inferior frontal. It will be seen to be well developed and to show no feature which is not seen in casts of modern crania. The fissure of Sylvius can be distinguished in part of its course, but shows no peculiar feature.

The Teeth.

A fragment of the alveolar border of the upper jaw, containing the first and second premolar and first molar teeth of the right side, was found; also a fragment of the lower jaw carrying the roots of the right lateral incisor and right canine. Altogether nine teeth were obtained; four of the upper series and five of the lower. In the following table these teeth are enumerated and the measurements of their crowns given. In Fig. 7 these teeth are represented in position :—

	Prox. distal diameter.	Labio-lingual diameter.
	Mm.	Mm.
1st Pm., upper, right	6·6	9
2nd Pm., upper, right	6·4	9·6
1st M., upper, right	10	11·6
3rd M., upper, left	7·5	9
1st Incisor, lower, left	5·2	6·2
Canine, crown only, lower, right	7	8
1st Pm., lower, left	6·5	7·2
2nd Pm., lower, right	6·5	7·2
1st M., lower, left	10·6	10

The teeth are thus small; the upper third molar or wisdom tooth is exceedingly small, having only the two outer and the anterior of the two inner

cusps (see Fig. 7). The crowns of the upper premolar and first molar teeth are so worn that the arrangement of cusps cannot be stated, but there is no reason to suppose they showed any peculiar arrangement. The crown of the first upper molar had a height of 8 mm.; the total length of the tooth, including the roots, was 17 mm. The spread of the roots gave a total breadth within the alveolus of 13 mm. The upper molar teeth have shorter roots than is common in modern English dentitions, but the roots are rather more separated or widely spread than is

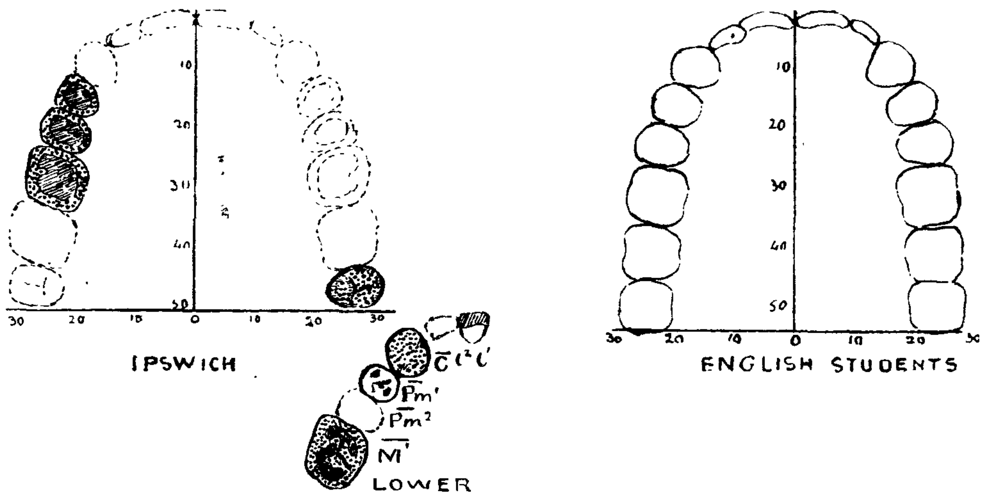


FIG. 7.—THE TEETH AND RECONSTRUCTION OF THE PALATE, COMPARED WITH THE PALATE OF MODERN ENGLISH STUDENTS.
The teeth actually found are shaded. Four of the lower teeth are also represented. (The degree of reduction is shown by the scale.)

usual. The total length of the lower incisor is 20 mm.—9 mm. representing the height of the crown. The crown of the lower canine is 9 mm. high. The first lower molar had a crown-root length of 19·6 mm., the crown height being 9 mm. The tips of the cusps are worn off this tooth, but there were plainly five cusps, the fifth being situated on the distal margin towards its labial border. When the upper teeth are replaced in an alveolar outline (see Fig. 7) it is seen that the palate must necessarily have been of small size—less than 50 mm. long and probably not more than 60 mm. wide. In English students (see Fig. 7) the palate has a length of 53 mm. and a width of 56 mm. The teeth are thus smaller than in the average-sized modern English dentition. In no sense can they be described as primitive, either in size or in form. They differ in every point from the teeth of Neanderthal man, and are more reduced in size than has yet been observed in the teeth of Palæolithic man. The fractured surface of the teeth shows the dentine of a chalky grey lustre—almost fibrous in structure. The pulp cavity and walls are stained red and contain fine granules of sand; the enamel retains its pearly lustre, being only slightly stained red. When submitted to examination by the X-rays, their substance is remarkably translucent. Certainly on the evidence of the teeth alone one would be inclined to reject the antiquity we have ascribed to the Ipswich

skeleton. When, however, the dentitions of certain reputed specimens of ancient man of a Palæolithic date are examined we will see that there is reason to believe that at an early period there existed races of mankind with small teeth.

The Skeleton.

We now turn to such fragments of the skeleton as have been preserved. Of the various bones the only one which shows a marked variation from the modern type is the tibia. I have been unable to find any bone in either ancient or modern races which shows similar features. The outstanding feature is the absence of an anterior shin or crest. This feature is best brought out by a section of the bone such as is shown in Fig. 8. It may be said definitely that this feature is not the result of any pathological change; there is not the slightest appearance of any inflammatory change nor of any pathological alteration in the form of the bone. Although the Ipswich tibia is altogether different from that of the gorilla, and in that respect is much less simian than the tibia of Neanderthal man, yet in this one feature, the absence of an extensor crest, and in another, the presence of a great transverse diameter, this bone shows primitive characters. The shin or extensor crest of the tibia is a feature which evidently appeared as the lower limbs

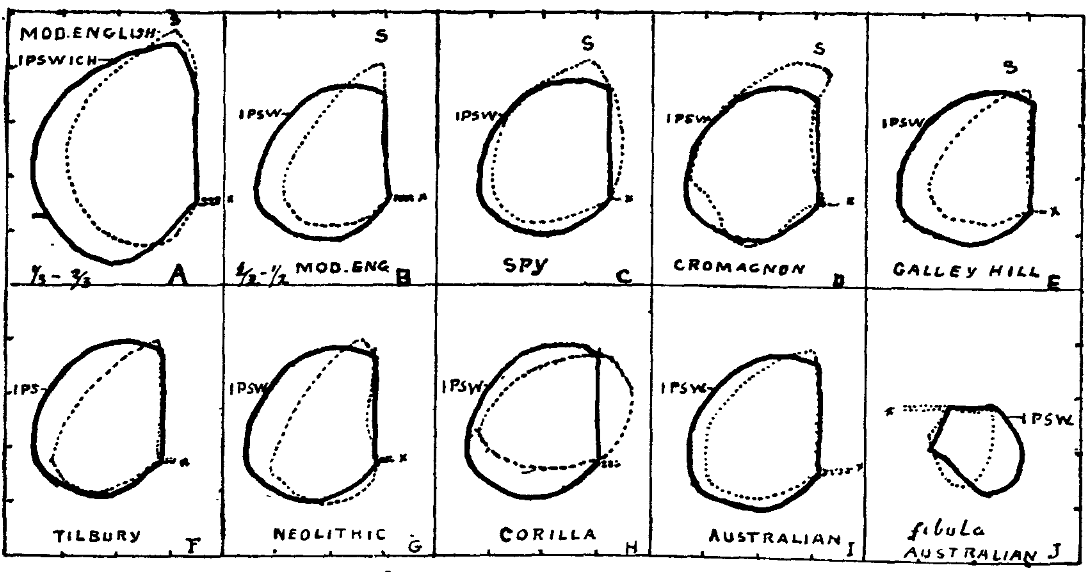


FIG. 8.—SECTIONS OF THE IPSWICH TIBIA.

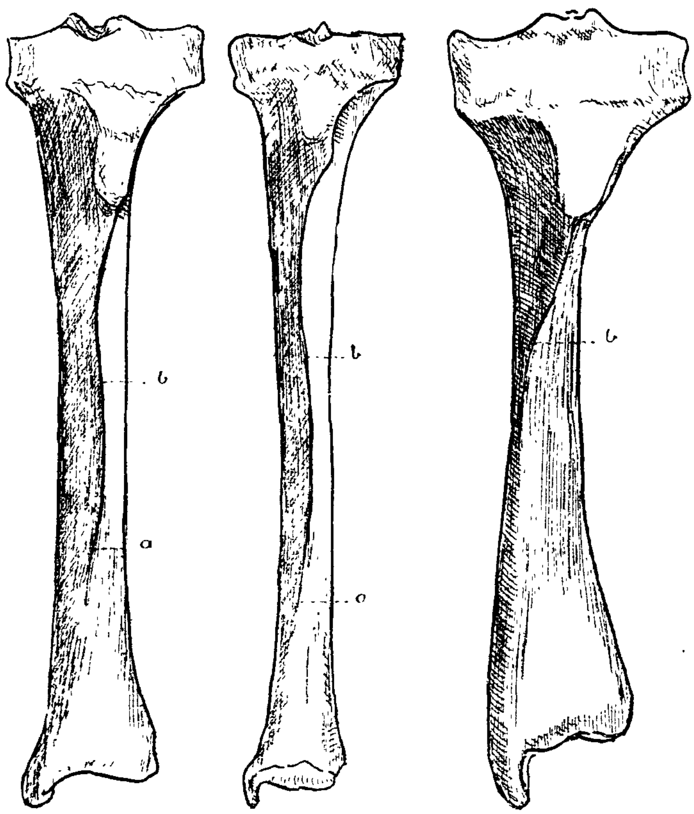
A at junction of upper and middle thirds; B, C, D, E, F, G, H, I, at mid-point. The corresponding outlines of various other tibia are indicated. The outline of the section of the fibula at the junction of its upper two-third and lower one-third is shown in J. The degree of reduction can be seen from the centimetre scale marked on the divisional lines.

became adapted for upright or pedal progression. The tibial crest is connected with the act of stepping off the toes during walking or running; it reaches its highest development in certain Palæolithic (Cro-Magnon) and Neolithic races. It will be thus seen that I attach importance to this feature of the tibia, and expect to find that it is not an individual variation but a characteristic of the Ipswich race.

Right Tibia.

The part of the shaft preserved and still embedded on the surface of the block measures 207 mm. (Plate XXX, Figs. 2, 3). The canal for the nutrient artery is seen to open 65 mm. below the upper end of the fragment; a deep groove for the artery runs from the canal towards the upper end for 20 mm. As in modern bones, the canal lies 8 mm. behind the line marking the attachment for the interosseus membrane. The position of the medullary canal is variable in modern bones; in one measuring 360 mm. the canal is 134 mm. below the articular surfaces; in another, 430 mm. long, it is only 132 mm.; so that the canal gives us no certain index to the amount which is missing from the upper extremity. It is quite clear, however, that the surface for the attachment of the popliteus muscles is absent, all except the most distal part—which is directed more inwardly in modern bones. The greater part of the ridge for the origin of the soleus muscle is present. From these facts I infer that about 60 mm. of the upper extremity of the tibia is missing.

As to the amount lost from the lower extremity, one must take the anterior border of the bone as a guide. In modern tibiæ the anterior border ceases to be sharp and begins to turn inwards on the shaft, owing to a change in the direction



NEANDERTHAL. MODERN. GORILLA.

FIG. 9.—THE EVOLUTION OF THE CREST OF THE TIBIA IN NEANDERTHAL MAN, MODERN MAN, AND IN THE GORILLA (*see* TEXT).

of the extensor muscles of the leg, at the junction of the middle and lower thirds of the tibia. In the Ipswich fragment the anterior border is a definite line—not a crest—and sharply separates the outer from the antero-internal surface of the tibia (see Figs. 8 and 9); it has not changed its position at the lower end of the fragment, so that we may infer that at least the lower third of the bone is absent. That gives a total length for the tibia of 207 + 60 + 133 = 400 mm., which is probably very near to the truth.

Whereas the shaft of all modern and ancient tibiæ tends to be three-sided, so that they appear triangular in section, this bone has only one flat surface—that for the extensor muscles of the muscles of the foot—the rest of the shaft is semi-cylindrical, so that in section the bone is "D" shaped. I have seen no tibia like it either in ancient or modern forms of man. It is not anthropoid in character; it is the exact reverse of the flattened tibiæ of Neolithic man. Its functional significance I cannot explain. In Fig. 8 sections of the Ipswich tibia are contrasted with corresponding sections of the tibiæ of various modern and ancient races.

The differences between the Ipswich and other tibiæ are best realized by contrasting sections taken near the mid-point of the shaft. In modern bones there are three flat surfaces, separated by distinct borders. The inner surface is subcutaneous, the posterior is covered by the flexor of the toes, the outer by the tibialis anticus. In the Ipswich bone the inner surface is not flat but strongly convex—as of the section of a semi-cylinder. A clearly marked line separates it from the outer surface, but its junction with the posterior surface cannot be indicated so definitely. Then at the upper end of the fragment the inner surface of the tibia is still convex, but less so.

The flat outer surface of the tibia is about 22 mm. in width, both above where it is slightly fluted, and also below, where it is perfectly flat. It is separated from the posterior or flexor surface externally by the slightly marked interosseus line. The posterior surface is convex from side to side, especially above where a wide oblique ridge marks the attachment of the soleus muscle. A faint line separates that part of the tibia from which the tibialis posticus arises from the areas for the popliteus (small triangular part present) soleus, and flexor longus digitorum. The surface for the tibialis posticus is directed outwards rather than backwards.

The characters of the tibia are best seen from the sections (Fig. 8, A, B). The medullary cavity is filled with a mixture of very fine sand and loam. The cavity at the lower end is nearly cylindrical in shape (diameter 12 mm.); the thickness of the cylindrical wall of the shaft—6 mm. At the upper end of the fragment the medullary cavity is 28 × 31 mm.—the outer wall of the shaft being here exceedingly thin. At the very upper end of the fragment the extreme diameters are: antero-posterior, 42 mm.; transverse, 33 mm. The interosseus line is 19 mm. from the anterior border and 23 mm. from the posterior. That is a normal relationship.

In Fig. 9 are shown the various stages in the evolution of the tibial crest or

shin. On the anterior border of the tibia there are three distinct sections: (1) an upper, for the origin of the tibialis anticus muscle. Its concavity is directed outwards (see Fig. 9); (2) an intermediate section—the shin or crest proper; in Fig. 9 this section lies between the letters *a* and *b*; it is relatively short in the tibia of Neanderthal man and is absent in the tibia of the gorilla. (3) A lower section in which there is no crest. The lower section corresponds to the lower third of the tibia of modern man, rather more than a third of the tibia of Neanderthal man, and to the lower two-thirds of the tibia of the gorilla. In the Ipswich tibia the intermediate section, crest or shin proper, is represented merely by a sharply defined line between the anterior and external surfaces.

Right Femur.

Part of the shaft of the right femur (middle third) is embedded on the same block as the right tibia (see Plate XXX, Fig. 2). It is important to note that the deeper part of this block is composed of stratified sand, coloured grey by the numerous particles of chalk in it. The matrix in which the bones lie is blacker, less sandy, more loamy. The distinctive character of the material or matrix round and below the bones becomes more evident when dried; there is then apparently an element best described as humus. Roots of plants end in the matrix. Another fragment (upper third) of the femur was also *in situ* in a neighbouring block; this block, too, had its deep layers composed of calcareous sand. The right femur and tibia are flexed at the knee and rest on a sandy stratum. The head and neck of the right femur lie on a third block (Plate XXX, Fig. 2); the head of the femur is still within the acetabulum, but only a part of the right ischium is visible and traceable. Enough, however, is present to show that the right thigh is ultra-flexed at the hip joint; the thigh must have been pressed to the side of the abdomen. The lower third of right femur is absent. In the block in which part of the right humerus is preserved there is also present an obscure mass of cancellous bone, which probably represents débris of the bones entering into the formation of the right knee joint. The parts of the femur present—from the upper surface of the head downwards—measure 372 mm. How much of the lower end is missing? The linea aspera is under 7 mm. wide, until it is 45 mm. from the lower end of the fragment. In the lower 45 mm. the inner border of the linea aspera becomes ill-defined and separates from the outer (which is well marked) so that at the lower end the lines are 9 mm. apart. I find from comparison with other bones—taking the point of divergence of the borders of the linea aspera as a guide—that about 125 mm. is missing of the lower extremity, and that the original length of the femur was about 500 mm. (490 to 500).

The diameter of the head of the femur can be measured; it is 47 mm.—the amount one expects in a tall man. The head is within the acetabulum. The neck is set at an angle of 120° (approximate). The great trochanter is absent (from decay), but I estimate that when measured along the axis of the neck, a line drawn from the innermost point of the head to the outermost point of the shaft at

the base of the trochanter measured about 100 mm. The neck, between its upper and lower borders, measured 40 mm. and from back to front 28 mm. The condition of the neck does not allow one to make accurate measurements.

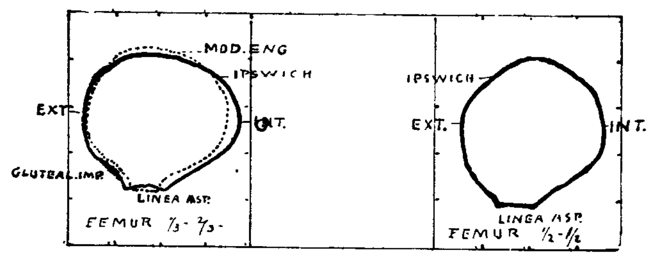


FIG. 10.—SECTIONS OF THE UPPER THIRD AND OF THE MIDDLE OF THE IPSWICH FEMUR COMPARED WITH CORRESPONDING SECTION OF MODERN BONE.

There is not a single feature of the femur which distinguishes it from modern bones. A section is given of the upper third of the shaft (Fig. 10), and it will be noted that the flattening is less than in Neolithic femora. The linea aspera is 135 mm. long, about 7 to 8 mm. wide, and only 2 to 3 mm. deep. At the upper end of the linea aspera its borders separate and one observes outside the external border a rough impression, slightly depressed, for the attachment of the gluteus maximus. The small trochanter is broken away. A ridge descends from the front of the neck to the shaft of the femur separating the inner and anterior surfaces. The inner surface in front of the small trochanter is 30 mm. wide. The ridge from the neck appears to be continued into another, which descends on the inner side of the shaft. In the lower half of the shaft this ridge is not present. The width of the shaft in the upper third is 33 mm.; its front to back diameter 28 mm. The femur is broken at the junction of the neck and shaft so that the condition of the anterior capsular (inter-trochanteric) line cannot be ascertained, but apparently the ridge was only well marked at its upper part. On the left femur the capsular line is preserved; it is such as occurs in modern bones.

At the middle of the shaft the femur measures 31 mm. from side to side, 32 mm. from before backwards; at the junction of middle and lower thirds 34 mm. from side to side and 32 mm. from before backwards. The curvature of the shaft is slight; when a straight edge is applied to the posterior surface of the shaft the deepest point of the curvature of the shaft is only 4 mm. from the straight edge. I have not given comparative measurements because it will be found that they are not different from some modern bones.

Left Femur.

175 mm. of the upper part of the left femur is preserved—very imperfectly. The head is gone and the greater part of the neck; the only feature well preserved is the anterior surface of the neck and shaft at the capsular line. The impression for the capsule is not rough nor ridge-like. The extensor surface of the left femur, as it lies in the block, is directed downwards against the flexor or posterior surface

of the right femur. The one is separated from the other by a distance of 35 to 40 mm. filled with brown loam.

In the matrix is embedded remains of the pelvis; also one large quartzite pebble—rounded—water rolled (77 and 35 mm.); a small white quartz pebble, a broken red (iron stone) pebble (Fig. 3); a number of very small gravel stones. Fibres of roots and a probable worm burrow also occur in the block containing the pelvis. It is to be noted that the block containing the remains of pelvis and heads of femora does not show the sandy stratum, only the upper or loamy layer.

Right Fibula.

This is preserved to the same extent as right tibia. Opposite the medullary foramen the fibula is flattened, measuring 17 mm. between the anterior border and the postero-external border, and 12 mm. in its thinnest diameter. The corresponding measurements below (2/3—1/3) are 17 × 14 mm. It will be noticed that the fibula is flatter and more massive than is usual in modern man. A section is shown in Fig. 8.

Other Bones of the Skeleton.

It is a matter of regret that no trace of the bones of the foot was found; one would expect them to show certain peculiar features correlated with the strange shape of tibia.

As regards the bones of the upper extremity, the humerus is certainly peculiar, but so eroded is its surface and so fragmentary is its nature that no definite statement or measurement can be given of it. The upper third of the shaft is three-sided—rather like the tibia in shape—a feature which is also indicated in the humerus of the Galley Hill skeleton. The three-sided form disappears below the insertion of the deltoid muscle—where it becomes cylindrical.

Parts of the right and left bones of the forearm were found (see Fig. 3) but in dimensions, markings and curvature they showed no departure from the well-recognized modern forms. They are slender for a man of 5 ft. 10 in. in stature. The shaft of the radius, near its middle, is 17·5 mm. wide and 12 mm. thick.

The bones of the right hand are well preserved. I isolated the semilunar, scapoid and trapezium, and compared them with the same bones of a modern hand (from a man 5 ft. 4 in. high). I could not detect in their articulations nor in their shape any departure from the modern form. In size they agreed with the bones with which they were compared. The metacarpal bones and phalanges also were in their markings and conformation in the closest agreement with modern bones. The transverse diameter of the base of the second metacarpal bone measured 20 mm.; its shaft was triangular in section; its breadth and its thickness were each 14 mm. The length of the third metacarpal is 68 mm., the fifth, 54 mm. At the bases or proximal ends the four metacarpal bones (second, third, fourth, fifth) measured 60 mm.

Racial Characters and bearing on the Evolution of Man.

When I made my preliminary examination of the Ipswich skeleton I was frankly sceptical of the age assigned to it by Mr. Moir. Here we have a man of 5 ft. 10 in., with a brain of the modern form, and quite modern in size (1,430 c.c.), with relatively small jaws and teeth, and all the features so like the men who live in England to-day that it seemed impossible that a form which lived before the deposition of the chalky boulder clay could have come down to modern times so little changed. My belief in Mr. Moir's accuracy of observation, his wide experience of the strata of East Anglia, his knowledge of the criteria which must be applied to obtain an accurate dating of fossil forms and ancient implements made me cautious of rejecting what, in a certain sense, runs contrary to our present conception of the recent and orderly evolution of man. My examination of the Galley Hill skeleton had convinced me that the modern type of man was much older in his evolution than most of us had hitherto expected. When, too, I came to examine the evidence relating to many past discoveries of Quaternary man it was apparent to me that in a great number of cases these remains were regarded as unauthentic, principally on the grounds that they were too modern in form. The discovery of Neanderthal man, and the recognition of his primitive nature, have led most anthropologists to suppose that he is a stage in the evolution of modern human races. We now know that Neanderthal man was in existence until well within the latter stage of the Quaternary period. Recent discoveries make it certain that the modern type of man was in existence long before the Neanderthal type was extinct. The Galley Hill remains and those of Bury St. Edmunds are of the modern type. There is a very close resemblance in cranial form between the cranial fragment of Bury St. Edmunds and the skull of the Ipswich man. The mandible from the coprolite pit at Foxhall, near Ipswich, possibly derived from the mid-glacial sands, is also of the modern type. It fits very well with the Ipswich skull. The Moulin Quignon mandible certainly is authentic unless we suppose Boucher de Perthes was either a fool or a rogue, and he was neither. It is of the modern type, very like the Foxhall jaw, and yet the stratum from which the Moulin Quignon mandible was derived is long anterior to the Mousterian period. The Grenelle, the Clichy, the Denise remains are, according to Rutot, pre-Mousterian, and they certainly are of the modern type. The various human skeletons discovered at Olmo and at Castenedolo, in the North of Italy, are also similar to modern human skeletons, and they are attributed to early Pleistocene and early Pliocene horizons. It will thus be seen that the Ipswich skeleton is not an isolated discovery. It is one of a great number, which, to my mind, clearly indicates that we have to seek for the evolution of the modern type of man—not in the Pleistocene but in the Pliocene formations. With the evidence derived from the discovery of the human remains, the discoveries of worked flints must also be taken into account.

Description of Plate XXX.

Fig. 1.—Photograph of right side of brain cast and skull. The supra-orbital fragment is detached and placed below. The third frontal convolution, with remains of rootlets, is plainly visible ($\frac{3}{5}$ natural size).

Fig. 2.—Photograph of the Ipswich skeleton when the blocks were grouped together ($\frac{1}{5}$ natural size).

Fig. 3.—Anterior aspect of fragment (207 mm.) of right tibia (C), placed for comparison with a right modern tibia (B) and the left tibia of Cro-Magnon man. The area for the origin of the tibialis anticus muscle lies between the asterisks ($\frac{2}{5}$ natural size).

Appendix.

Since the reading of the above paper a discovery has been made at Charsfield in Suffolk, which affords corroborative evidence in favour of the antiquity of the human skeleton discovered at Ipswich, and an answer to those of our critics who complained that no other bones had been found at the same horizon at which it occurred.

Charsfield lies to the north-east of Ipswich, and is about eleven miles distant from the spot where the human bones were found.

A small pit there, in a shallow, dry, valley, is being worked for stone, and shows an eleven-foot section composed of one-foot surface humus. Three feet of blackish gravel resting upon a weathered surface of chalky boulder clay.

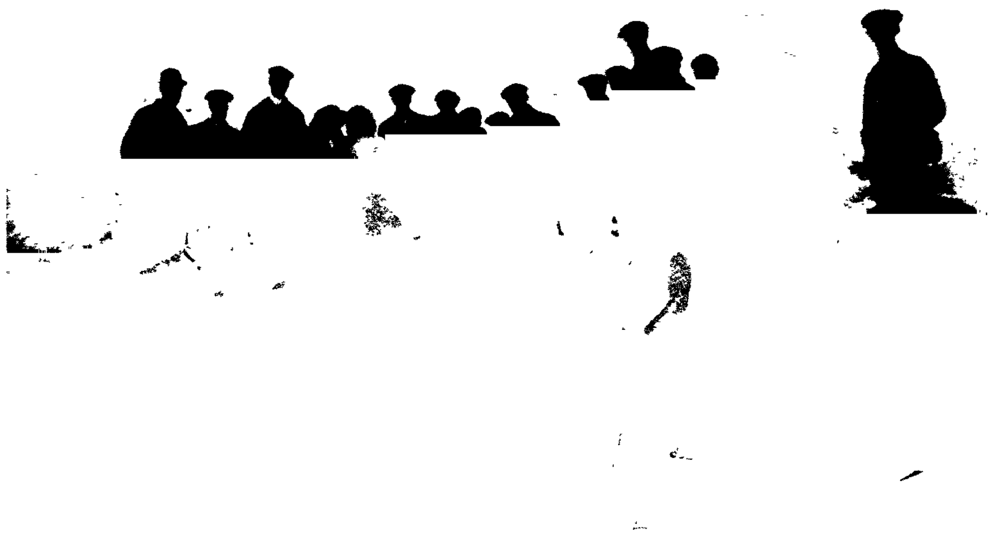


FIG. 11.—SITE DURING ACTUAL DIGGING OUT OF REMAINS.
Portion of skeleton still *in situ*.

This latter deposit is about four feet in thickness and is underlain by three feet of loamy gravel.

At the bottom of the section the fine stoneless middle glacial sand is exposed.

Lying on the surface of this sand, and partly embedded in it, and in the different overlying material, a large curved tusk associated with numerous pieces of elephant bone have been discovered.

FIG. 12.—VIEW OF SIDE OF PIT WHERE SKELETON WAS FOUND, SHOWING BOULDER CLAY RESTING UPON THE UNDERLYING MIDDLE GLACIAL SANDS AND GRAVEL.

The accompanying photograph, taken by Mr. Frank Woolnough, with the

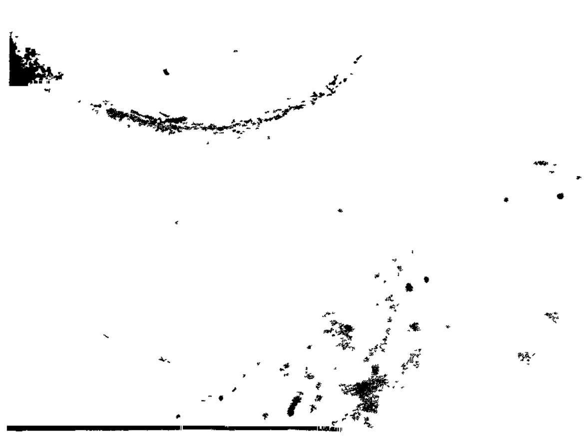


FIG. 13.—MAMMOTH TUSK WHICH WAS FOUND AT CHARSFIELD AT THE SAME HORIZON AS THE HUMAN REMAINS.

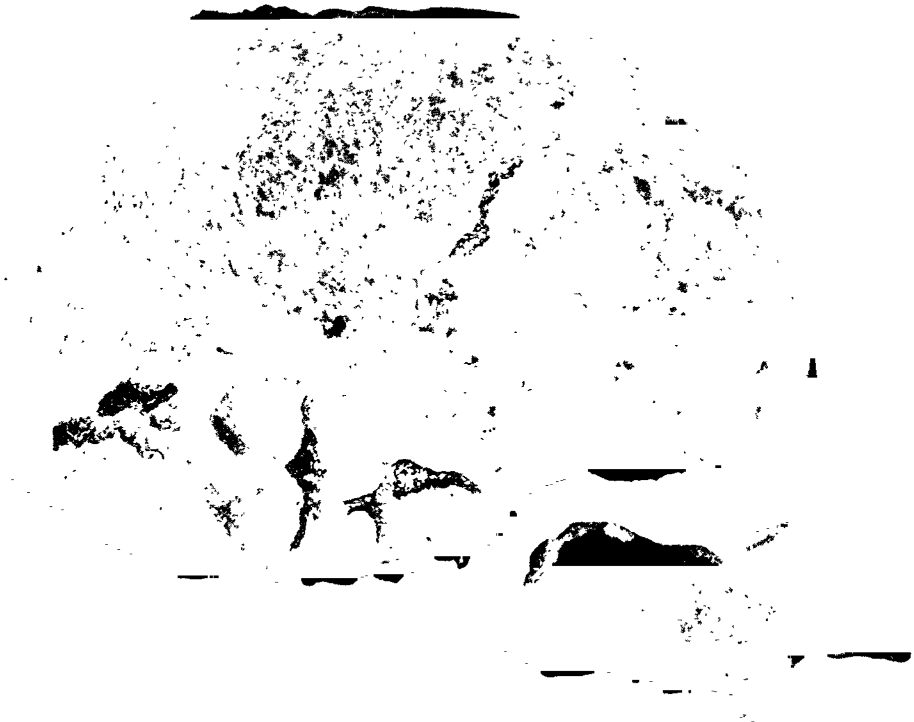


FIG. 1.

FIG. 2.

FIG. 3.

HUMAN SKELETON FOUND BENEATH A STRATUM OF CHALKY BOULDER CLAY NEAR IPSWICH

camera suspended over the pit, shows the tusk *in situ*, which was afterwards carefully removed and taken to the Ipswich Museum.

The other photograph shows the section described above. It will be noticed that these remains occurred at exactly the same horizon as the human skeleton found at Ipswich, and examination has shown that the amount of mineralization and staining by iron are also the same in the bones themselves.

It is somewhat difficult to identify the exact species of elephant by a tusk alone, but it seems tolerably certain that the remains found are those of *Elephas primigenius.*

This interesting discovery was first brought to my notice by Mr. W. H. Youngman of Charsfield, and Mr. E. P. Ridley, F.G.S., Mr. Frank Woolnough, Curator of Ipswich Museum, and Mr. Fredk. Canton accompanied me when I went over to have the tusk removed.

It appears to me that this find affords support to my contention that the top of the middle glacial sand was a land surface before the deposition of the chalky boulder clay.

Also these two discoveries at the same geological horizon, and within eleven miles of each other, suggest that this is a deposit rich in remains of great interest, and now that owners of pits in East Anglia are beginning to realize the importance of these things it is highly probable that many other relics will be brought to the notice of scientific men, which, under ordinary circumstances, would have been thrown away as of no value.

NOTES ON THE RELIGIOUS BELIEFS, SUPERSTITIONS, CEREMONIES AND TABUS OF THE DUSUNS OF THE TUARAN AND TEMPASSUK DISTRICTS, BRITISH NORTH BORNEO.

By Ivor H. N. Evans, B.A., late British North Borneo Company's Service.

The religion of the Dusuns should probably be described as partly animistic, though with this is combined a hazy belief in a supreme God, and also in certain local or village gods. A belief in spirits is very general, but these spirits, which are all included under the term of "hantu," do not seem to be to any extent classified. Those of rivers are believed in, and rags are tied to certain trees above h e water as an offering, while the banyan tree is also supposed to be the haunt of a spirit. Certain stretches of jungle are often said to contain a hantu, and in consequence are given a wide berth. Such spirits form a class in themselves, and apparently are not ghosts of the departed. Whether the spirits of sickness and those which bring ill-luck are of the latter kind appears uncertain, but in the case of epidemic disease, the spirits which cause it seem never to have inhabited human bodies. The ghosts of the dead, whose home is supposed to be at the top of Mount Kinabalu,[1] are certainly thought to be capable of loitering on their way thither and causing trouble, for the old women of the Tempassuk, when a death has newly occurred, weep and call to the spirit: "Do not stop here, for your way lies to the left" (*i.e.*, to Kinabalu); and natives always avoid graveyards as much as possible. The bier on which the body has been carried is, in some cases, cut to pieces at the grave-side, probably in order to prevent the return of the ghost, and in others, the men on returning from a funeral slash with their *parangs* or chopping knives at the steps of the house and at the door of the room in which a death has occurred; the object here, again, being to prevent the soul from lingering near the house and bringing evil upon its inhabitants. The chief gods of the Dusuns are the beneficent Kenharingen and his wife Munsumundock, who are responsible for the creation of the world, and, in the Tempassuk, to these is added Towardaken, who is the son of Kenharingen, but was banished by him for his evil deeds. In addition to these, the Tempassuk Dusuns—I do not know if it is true for those of Tuaran—believe in a god of the village or Kenharingen Tumanah (Tumanah = *? tanah*—earth (Malay)), who is mentioned in the taking of oaths together with Kenharingen in the skies. The chief gods of the Dusuns have, however, no connection with the

[1] 13,600 feet high.

religious ceremonies performed by the people, the object of all these being the propitiation or exorcising of evil spirits, to whom are attributed all such calamities as epidemics, failure of crops and so forth. Evil spirits who have their dwellings in trees, rivers, and stretches of jungle must be appeased by offerings, and the ceremonies performed for driving them out will be found described below in connection with the special observances of the people of Tuaran. The term generally applied by the natives to all religious observances is "Menghadji," and the most curious feature about the ceremonies is that certain initiated women are the priestesses, upon whom rests the successful carrying out of the rites. Men, though present, play only a subordinate part in the performance, the duty assigned to them being that of providing a musical accompaniment to the women's chants. These Bornean priestesses form a somewhat notable exception to the general custom among the primitive shamanistic cults of Asia, in which men alone take the principal part. At Tuaran there are regular fixed fees for young women wishing to enter the ranks of the initiated, and their instruction covers a period of three months. The fees received by the instructresses are, at the present day, generally paid in money, though formerly it was customary to pay in goods. I have been informed by natives that the women use a secret language in their chants, and thus the mysteries of their conjurations are safeguarded from becoming public property. Certain more or less fixed yearly festivals are found among the Dusuns of both districts, that connected with the expulsion of the evil spirits being the most generally observed. With regard to the human sacrifice termed Sumungulph which consisted in slowly killing a slave with spears in order that his ghost might carry messages from the living to the spirits on Mount Kinabalu, I have been able to gather nothing fresh. Various animals are regarded as omens either of good or evil portent; and these will be found treated below. Head-hunting was formerly prevalent in both districts, until forbidden by the British North Borneo Company, but certain rites connected with it are still carried on. Such of these as I have observed will be found described under the separate headings of the two districts. On taking a head, a warrior was entitled to be tattooed; but with the prohibition of head-hunting this custom has become obsolete, and much tattooing is now only seen on the bodies of old or middle-aged men.

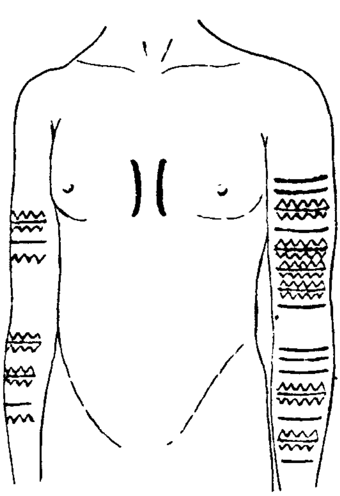


FIG. 1.—TATTOO MARKS ON MAN OF KENDASANG IN THE ULU BUNDUTUHAN DISTRICT.

RELIGIOUS CEREMONIES OF THE TUARAN DUSUNS.

While the menghadji and the belief in evil spirits are general among the Dusuns, the people of Tuaran differ considerably in their religious ceremonies and observances, as they do in other respects, from the Dusuns of the Tempassuk. The

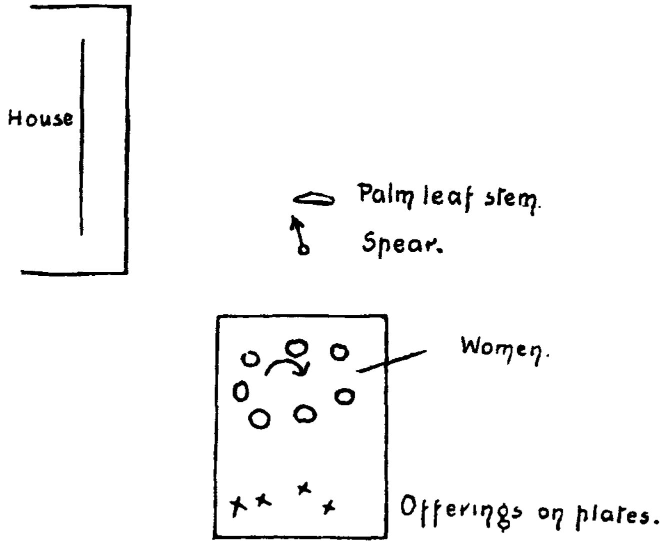
most striking differences which are observable at Tuaran are the much greater elaboration of the ceremonies and the very prevalent cult of the Gusi, a kind of sacred jar.

The sacred jar cult.—Jar worship is chiefly observed at Tuaran and Papar, though, I believe, it is also carried on in other districts. Various kinds of old jars are found in Borneo, and these are always regarded as valuable property by the natives. Such are the haga, the tompok, the sungkial and the gusi, the three latter being worshipped as the habitations of spirits; the tompok and the gusi are said to be tenanted by evil, and the sungkial by friendly spirits. It is the gusi, especially, which is reverenced at Tuaran, and families vie with one another to obtain a specimen, from 2,000 to 3,000 dollars being no uncommon price to pay. Each member of a family has often a small share in the ownership of the jar, and owing to the frequent and complicated lawsuits which formerly arose concerning the ownership, it became necessary that this litigation should be stopped; consequently a proclamation was issued by the then Governor of British North Borneo, which, while making provision that the gusi should be placed at the disposal of any of the "waris" (family of owners) who might require it for religious purposes, at the same time absolutely forbade any case to come to Court concerning the ownership of such a jar. The gusi is made of rather translucent greenish-brown porcelain, which is covered with cracks, and is obviously of Chinese manufacture. Specimens may vary in size considerably. The gusis are always kept in a railed-off enclosure, in one of the inner rooms of the house, and annual offerings are made to them. I have it on the authority of Omboi, a Tuaran Dusun, that the old women go to a jar and wipe its mouth, saying at the same time, "Do not be angry with me for I have given you food." (*Jangan kon marah sama sahya, sudah sayha kasi makan sama kon.*) At Tuaran the name of Mengahow is given to the annual "menghadji" performed over the gusi. Unfortunately, owing to the short time I was stationed at this place, and my then want of knowledge of Malay, my notes on the religious ceremonies are somewhat fragmentary—much of my information having been gathered subsequently from a somewhat stupid Tuaran native, who was for some time my servant in the Tempassuk district. In concluding these notes on the gusi, two superstitions concerning sacred jars may be mentioned, one of these is about the jar called "Buluhon." The Buluhon is a kind of gusi, and the Tuaran Dusuns say that Kenharingen opened a window in heaven and let it down on a cord to the earth. The second story is about the banyan. This tree is reported to be the abode of a hantu or spirit, and it is said that men coming suddenly on a banyan tree in the jungle have seen many gusis standing below it, but when they have looked again the jars have vanished, for the hantu has snatched them up again into the tree.

DRIVING OUT THE EVIL SPIRITS—"MOBOG."

The most important yearly ceremony of the Tuaran Dusuns is the menghadji which is called "Mobog," when all evil spirits which may have collected in the

village during the year are solemnly expelled. In September, 1910, I was lucky enough to see performed a large part of what I was told were these rites. The ceremony has the object of bringing good luck to the houses in the ensuing year and of driving away the evil spirits which are considered to be the cause of diseases. The chief performers are women, as is the case in all Dusun religious ceremonies, the minor parts of drum-beaters or gong-beaters being assigned to the men. A procession of women, in full ceremonial dress, goes from house to house, stopping at each to go through their performances. It is preceded by a boy carrying a spear on which is impaled a large palm leaf bundle containing rice, next follow two men carrying over their shoulders a bamboo pole from which is slung a large gong of the variety known as tawag-tawag and a drum. These in turn are followed by the women who are to perform the ceremony, one of whom carries on her back a small sucking-pig in a basket. Each woman carries a wand in her right hand, which has a spiral strip of bark cut from it running from top to bottom. These wands, I am informed, are used for beating the sucking-pig. The women also bring with them for use in the ceremony bunches of small brass bells, which are shaken in time with their movements by quick backward and forward jerks of the wrist, and as well as these a somewhat castanet-like instrument, the "tetubit," consisting of two discs of brass attached by string to a bone handle. This instrument is used to beat time to the chant. On arrival at a house mats are spread in front of it by some girls. A man then brings the stalk of a coconut palm leaf, and having bent the proximal or broader end, which is attached to the tree, at right angles to the rest of the stalk, he sharpens the distal end slightly and plants it firmly in the ground. In front of this the spear is placed point upwards and around the base of the palm leaf stem is placed the leaf which was carried on the spear point. The women then take their places on the mat and the ceremony begins.



SIGN SET UP AFTER MENGHADJI PADI, BY TUARAN DUSUNS.

This consists partly of chant, partly of dance and chant combined. At one time the women are moving slowly round in a circle from left to right, chanting the while and emphasizing the time by means of the tetubit; at another they divide themselves into two rows which stand facing the spear, their leader standing out in front and conducting the song while they join in the chant. At the same time they

perform a posturing dance and make use of the bunches of small bells, one of which they carry in either hand.

During the ceremony rice has been placed on the palm leaf stem, and dishes of young rice blades and other herbs have been set on the mat behind the women. When the ceremony is finished the procession is again re-formed and streams off to the next house. It was up to this point only that I observed the ceremony, since at the time I was ignorant that anything further was in contemplation and also of the meaning of the proceedings. I have been informed, however, that when all the houses have been visited, the performers make their way to the river, the evil spirits which they are supposed to have collected on the way following them. On arrival there the spirits embark on a raft, which has been previously moored in readiness. This raft is covered with figures of men, women, animals, and birds made of sago palm leaf, while offerings of cloth, cooking pots, parangs, and food have been placed upon it. When all is ready the raft with its cargo of spirits is pushed off into the stream and allowed to float away. Should it, however, ground near the village it is pushed off again with all speed or otherwise the spirits might escape. I am informed that the small sucking-pig is beaten with the wands carried by the women and that its cries help to attract the spirits; at the end of the ceremony it is killed and its body thrown away.

NOTE ON MENGAHOW (MENGHADJI GUSI) AND MOBOG (DRIVING OUT OF EVIL SPIRITS).

There is some apparent contradiction in my notes with regard to these two ceremonies owing to a conflict of native evidence. After witnessing the ceremony described above, I made what inquiries I could about it through an interpreter, and some answers I received tended to show that it was connected with the gusi. Afterwards I obtained further information from Omboi, a Dusun of Tuaran, whom I took with me from that place as my servant. He told me that the ceremony I had seen was the menghadji of spirits and that, as mentioned before, a raft was moored in the river to receive them. Against this, however, he also informed me that the menghadji of the gusi took place after the young rice had been planted in the fields. Now on the latter evidence it would seem that the menghadji gusi should have taken place just about the time I was at Tuaran, for some of the young rice was then still in the nursery, though the greater part of it had been fairly recently planted out. I had some doubts as to whether I should include an account of the ceremony at all in this article owing to the discrepancies in the evidence, but have decided to do so owing to its interesting nature. Two facts seem to point rather strongly to the menghadji having been for the purpose of driving out evil spirits. Firstly, that I was told at Tuaran that the ceremony was a "Menghadji Orang," *i.e.*, a ceremony for averting evil from people, and secondly, that a sucking-pig was carried to attract the spirits so that they should follow the celebrants. This would hardly be found in a gusi ceremony, for in that case the Dusuns wish to keep the spirits within their dwellings, the gusis.

Menghadji of young Padi (Rice).

This ceremony, which is named Masalud, takes place after the wet padi (Ranan) plants have been transferred from the nursery to the fields and have attained a fair height. The women, as before, take the chief part in the ceremony, but are accompanied by male gong-beaters. A fowl is sacrificed and eaten and an image of the bird made from its feathers is set up in the crop with a leaf of a certain species of palm behind it. Water is also sprinkled over the padi.

Menghadji after Harvest ("Menomboi.")

I can give only such details of this ceremony as I obtained from a native. A small piece of steel is placed in a basket full of padi which stands on a parang (working knife). A religious ceremony is then performed. It is said that padi is offered to any large stones the celebrants may come across. This rite is apparently only used after a successful harvest.

Menghadji for Rain.

The name given to this is "men awa." Here again the information is collected from native sources. The ceremony is, of course, only performed during a long drought. Every woman brings a basket of husked rice to the river-side and an egg is placed on top of the basket. A religious ceremony is then performed by the initiated women, and finally each of them takes the egg and a handful of rice from the different baskets, and throwing these into the water, says to the spirit of the river, "This is your share." The remainder of the rice in the baskets is given to the initiated women as wages for performing the menghadji.

Ceremonial Dress.

Some description may well be given here of the dress worn by the women of Tuaran on ceremonial occasions, as this differs very materially from that in everyday use. The ceremonial headdress consists of stiff bunches of feathers, those of the cock or the argus pheasant are used, cut and dressed into the form of a shuttlecock, having a long pin of bamboo fixed into the under surface. They are ornamented at the top with pieces of red cloth, and are inserted into the hair so as to form a sort of crest running backwards from the front of the head, where, owing to the hair being piled up, the hindermost clump of feathers is the most elevated, the crest thus having an upward slope from front to back. From the top of both the foremost and also of the hindermost tuft of feathers depends a string of green beetles' wings (Fig. 2, A). Below the crest of feathers there surrounds the head a fillet of red cloth backed with rattan cane, which is ornamented with oblong and square plates of silver gilt; these are embossed with various patterns. The body from the neck to the waist is clothed, in most cases, in a tight-fitting blue or black jacket of Chinese cloth, and over this is worn an elaborately draped scarf of Bornean manufacture. These scarves, which are very old, are said to have been made by the Brunei Malays; they are very highly valued, and are only worn on

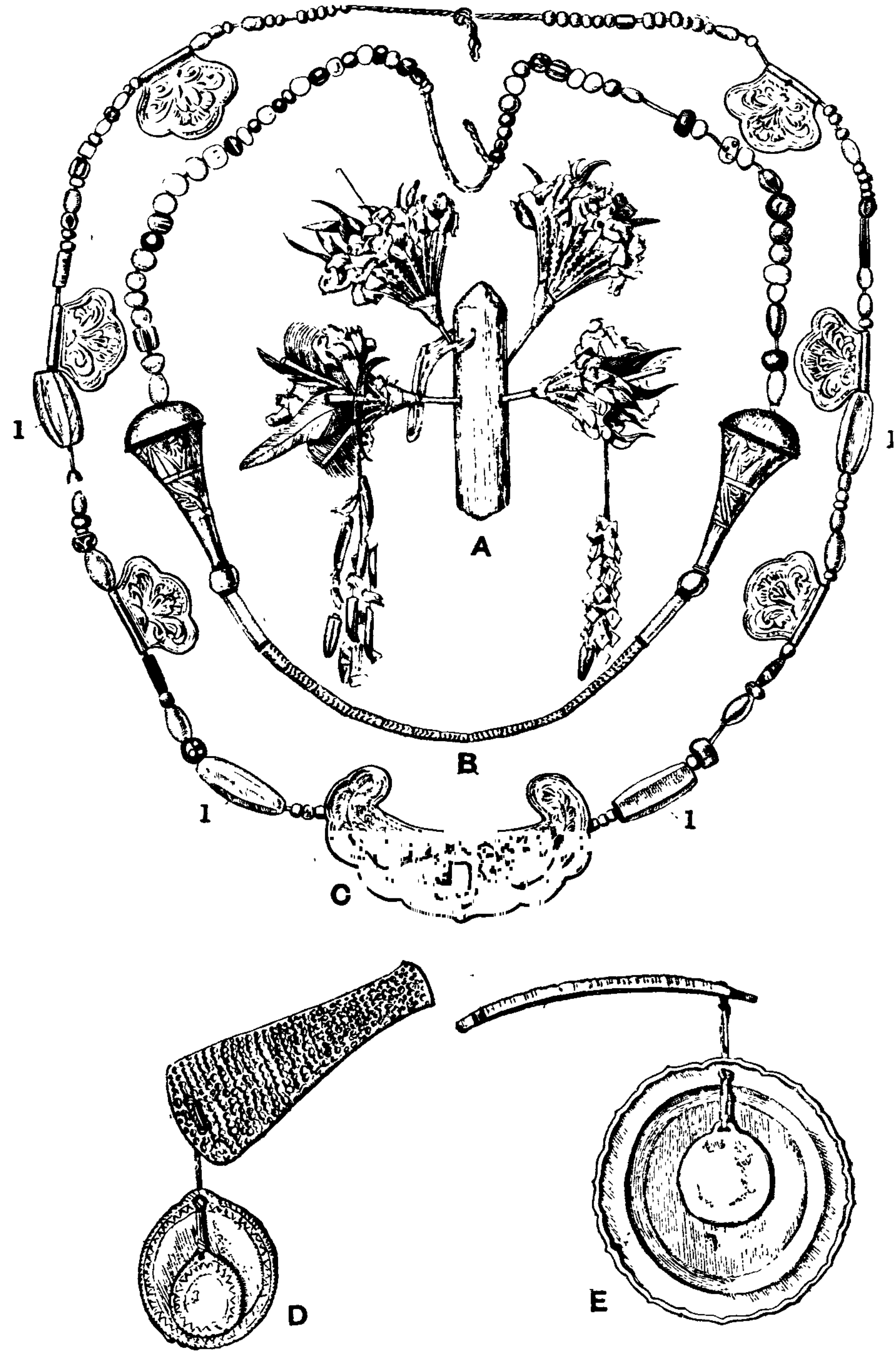


FIG. 2.—CEREMONIAL OBJECTS FROM TUARAN.

A. Woman's head-dress of cocks' feathers. The four tufts of feathers are fastened to bamboo pins which are inserted into a receptacle of palm-wood, used as a mere holder. $\times \frac{1}{4}$.
B. Ceremonial necklace (Kamuggi). $\times \frac{2}{5}$.
C. Ceremonial necklace (Okob). The plaques are of silver, backed with copper. The beads marked 1 are of cornelian.
D. Tetubit used in ceremony of menghadji padi. $\times \frac{1}{4}$.
E. Tetubit used in menghadji for sickness. $\times \frac{1}{4}$.

occasions of ceremony. Their colour is generally a mixture of red and yellow. Around the waist are red, black, or natural-coloured rings made of rattan cane, such as are affected by all Dusun women. Below these is a short ceremonial skirt of variegated cloth, the material of which resembles that of the scarf, and this also is old and considered very valuable. The majority of the women taking part in the ceremonies wear round their necks and hanging down the breast, long, many-folded necklaces composed of old Chinese or Dutch beads; among these are round beads of cornelian, and also long bugles of the same stone, recalling by their shape the wampum of the North American Indians. Strung on the necklaces are long cone-shaped ornaments of embossed silver, from about 3 to 3½ inches long, which are hollow, but are filled with plugs of wood rounded at the top. The cones are so disposed on the chain that they hang in pairs with their points directed downwards to form a sloping series on each side of the jacket. This necklace is termed a "Kamuggi," and a good specimen of many folds will often fetch from 60 to 70 dollars. Another form of ceremonial neck ornament is the okob, which is figured on page 386, together with an inferior specimen of the kamuggi—the only one which I was able to obtain (Fig. 2, B, C).

INITIATION.

On attaining the age of puberty youths go through a small initiatory ceremony. They are given cakes of sago mixed with sugar to eat, and a menghadji is performed over them. I have this on the authority of Omboi, a Tuaran Dusun.

HEAD-HUNTING.

Head-hunting ceremonies, as remarked before, are common to both districts At Tuaran the skulls of enemies are kept in the common verandahs of long houses, one which I have seen boasting as many as forty. My notes on this subject are rather fragmentary, for the natives were chary of speaking of forbidden practices, chiefly, I believe, owing to my being a Government officer. However, I have been able to make a few observations in both districts, and they will be found given below. Once, nevertheless, at Tuaran I was witness of a small portion of a head-hunting ceremony. Seven or eight men were walking in single file near a village and were keeping up a continual war cry, which had a peculiar whistling sound. Each man was wearing a ceremonial sword with a very long scabbard that was profusely decorated with human hair. This sword is called "Tenumpassuan," it consists of a straight blade about 2½ feet long and a brass grip with guards; when combined with a short sheath it is usually known as "pedang." The scabbard of the tenumpassuan is about 4 feet long and broadens out to a width of 6 inches at its further end. The outer face is covered with rude carving. The leader of the party carried a conch shell trumpet on which he blew occasional blasts. All the men wore attached to their waists large bunches of the long dried leaves of a particular kind of plant called by the natives "silad"; this is always used in connection with head-hunting, and the skulls which hang up in the houses

are frequently covered with it. One man had a human vertebra, to which was attached a plaited ornament of the same plant. On making inquiries it appeared that an ex-policeman who had sometime previously taken a head—where, I do not know—had returned home, and that a buffalo was to be sacrificed and a ceremony gone through in order to ward off any evil consequences of his act. The rites performed after the return of a head-hunting party are called "Domali," and an annual sacrifice of a buffalo is made to the heads which have been taken. I have been informed that during this ceremony the rims of earthenware pots are decorated with flowers. At the end of it the pots are stamped on and broken by the celebrants. Possibly this may signify that the warriors will stamp down and break whatever enemy may oppose them.

TABUS.

My observations on this subject are, again, fragmentary, but the following tabus are common :—

A man may not mention his own name, that of his father, mother, mother-in-law, or father-in-law.

The eating of pork is tabu. I have been told by a Tuaran Dusun that this is because his people would be ashamed if the neighbouring Mohammedan Bajaus were to revile them as pig eaters. The down-country Dusun of the Tempassuk has, however, no such scruples, though his village is frequently quite close to those of the Bajaus.

OMENS.

A flying swarm of bees is considered an evil omen. If a man hears or sees one he must do no work in his rice field on that day or his harvest will not be a good one.

VARIOUS BELIEFS AND CUSTOMS.

In the men the incisor and canine teeth in the upper jaw are filed down, in some cases to the level of the gums. This is probably considered a mark of manhood. The natives say they would be ashamed to have long teeth. Possibly the Dusuns believe that unfiled teeth make a person like a dog.

You must not point at the rainbow; if you do, the finger you point with will wither away.

Lunar eclipses are caused by a demon called the Tarob, who swallows the moon.

Small-pox comes once in forty years and kills one half of the population. This is owing to an agreement between Kenharingen and Bisagit, spirit of small-pox, whereby Bisagit takes a toll of half of all Kenharingen's men.

A small black and white bird called by the natives "Tempak Longun" is said to be the ancestor of the Chinese, because its note resembles the sound of their speech.

The firefly or "niniput" (*nini* = ancestor) is the spirit of a dead man.

The praying mantis points out a husband for a woman if she asks it.

TEMPASSUK DISTRICT.

The menghadjis customary in the Tempassuk are very similar to those at Tuaran, but, as has been observed above, the ritual is not so elaborate, so I do not propose to give any account of them except in so far as I have found them to differ.

The menghadji for the driving out of evil spirits appears to be considered the most important, and even the Mohammedan Bajaus perform it. A religious ceremony is carried out over a man who has returned from a different district, in order to banish any evil spirits which he may have brought with him. Natives, too, who are proceeding on a journey and are to stay for some time away from home, take a fowl with them to sacrifice at their destination, so that the spirits of the place may not afflict them with sickness. The rattle-like implement of the menghadji, which corresponds to the tetubit of Tuaran, is regarded with great respect in the up-country villages of the Tempassuk. In Tambatuhan, for instance, it is kept in a special bamboo receptacle, and only women are allowed to handle it. Gumpus, the head-man of the village, told me that it was the Dusuns' Koran. In many cases it is hung up close to the door of the house, as it is considered so potent that evil spirits seeking an entry will be frightened away on seeing it. There is nothing particular to note about the costume of the women at religious ceremonies, except that a hood of native cloth, dyed dark blue, is always worn during a menghadji. This is also frequently used for field work and on other occasions. Celebrants returning from a menghadji strew their path with the feathers of the cock which they have sacrificed.

KENHARINGEN TUMANAH.

A Kenharingen Tumanah, or local god, appears to be commonly associated with each village, and, according to the folklore of the Dusuns, sometimes assumes the shape of an animal. In one story the Kenharingen Tumanah becomes a scaly anteater and in another a bee.

HEAD-HUNTING.

Head-hunting was formerly extremely prevalent in the upper portion of the Tempassuk Valley and neighbouring villages were often at feud. The people of Koung and Kiou were hereditary enemies, as were also those of Kiou and Wasai. Heads are still preserved in many localities, but it is customary to keep them in a special head house, or they may be hung outside a grain store. A case of head-hunting occurred in the Tempassuk about three or four years ago, and the culprits were not discovered for some time owing to the collusion of the murderers with a local headman, who, by means of threats, prevented evidence being given when a Government inquiry was held. The following facts, however, came to light after the lapse of about a couple of years. Two young men of Wasai determined to take a head, and making their way to Kiou, killed a woman who was working alone in

a garden at some distance from the village. (The Kiou-Wasai feud had long been settled by compensation being paid for the last head taken.) Hearing, as they thought, someone approaching, the two young "warriors" made off without having had time to take the woman's head. The witnesses for the prosecution proved that the two accused had been seen carrying weapons in the neighbourhood of Kiou at about the time of the murder, and also that they had later gone through a ceremony such as is usually performed after the return of a successful head-hunting party. One of the chief witnesses was the woman who had performed the ceremony over them. The two head-hunters were hanged at Jesselton shortly after I went to the Tempassuk District, and the headman who assisted them is now languishing in Sandakan gaol. Three mementos of the affair are now in the possession of Mr. H. W. L. Bunbury, then District Officer at Tuaran: they consist of a particular form of conical hat with a thick brim, from the apex of which rises a small shaft of wood about 6 inches in height, to the top of which are attached several long cocks' feathers. The other two articles are small wooden models of faces, which are quite roughly carved. These are supposed to represent the head, which, as stated above, was not taken, and inasmuch as both men had had a share in the affair, two models were made, since each man might claim to have taken a head. The following are the only other facts I have been able to gather about head-hunting practices in the Tempassuk. A purification by bathing is gone through on returning with a head. The head is set upon a stone. Tompo of Kiou tells me that the wooden models of heads are called Tenumpok.

TOWARDAKEN.

Towardaken, who, according to the legends of the Tempassuk, is a son of Kenharingen, is evilly disposed towards men. Kenharingen made all men equal, but Towardaken, who did not like this, brought it about that some men should be rich and others poor. For this crime he was banished by Kenharingen. Towardaken does not like a good harvest, for then all men become equally well off. It is said that women who are conducting a menghadji sometimes call out that they have seen Towardaken.

THE LIMPADA.

The limpada is a tree which the Tempassuk Dusuns consider sacred to Kenharingen, who has decreed that no man shall climb up into it, cut its wood or take its fruit. If such an impious act is done the offender will be afflicted with ulcers until he dies. Natives are consequently very much afraid of this tree; however, if one is come across in making a clearing in the jungle for rice planting it may be cut down after a religious ceremony has been performed, though it is frequently left standing. The tree grows to a good height and has long shiny lanceolate leaves; its fruit in shape resembles an enormous Victoria plum, about 1 foot long, and is bright red with a shiny skin. Whether the plant has any power of producing ulcers I do not know, but it is quite possible, as so many of the Bornean forest plants have an extremely irritating sap.

Graves and Burial.

Burial in large earthenware jars of Chinese manufacture is common, as is also the case at Tuaran. It is interesting to note that where jars sufficiently large to hold the dead body cannot be obtained, various attempts to comply with custom are observable. In some villages jars are placed on the head of the grave while the body lies below encased in a rough wooden coffin; in others, perhaps, only a tiny jar about a foot high will be found standing on the grave. The actual grave is covered with a chevaux-de-frise of sharp bamboo points to prevent wild pigs from digging up the corpse. Over the whole is generally built a small wall-less hut, the roof of which has long eaves which are often rudely carved: occasionally umbrella-like structures covered with European calico, two to each grave, are erected instead of a hut. Under the hut is sometimes placed a model of a human figure in wood, but whether this represents the deceased or is a remnant of some custom of human sacrifice (*i.e.*, takes the place of a sacrificed slave) I have not been able to gather from the natives whom I have questioned. In many cases the bamboo fence which surrounds the whole structure is profusely decorated with models of parangs (working knives), cocks, hens, buffaloes, swords, spears, and guns carved from palm wood. These probably represent offerings to the spirit of the deceased, the actual objects being too expensive. The same kind of thing is common in China, where sham paper money and clothes are burnt at the grave, and models of opium pipes made of cardboard and paper are provided for the spirits. Sirinan of Kampong Piasow in the Tempassuk informed me that food offerings are not made to the dead by his people, though this is certainly done at Tuaran. The clothes of the deceased are hung either on the fence of the grave or else on a tree close to it, as to wear the clothes of a dead person would be considered to court disaster. Those of young virgins are frequently embroidered before being disposed of in this manner. The destruction of the funeral bier has been mentioned in the introductory remarks. I observed a case of this at Piasow. After a funeral the mourners all go to bathe in the river in order to purify themselves. Before leaving the subject of interment two further customs with regard to jar burial may well be mentioned. The first is particularly interesting as illustrating the differences of custom which may prevail within small areas. At Tuaran it is quite usual when a jar is wanted for a funeral to take one from an old grave, while at Tengilan, not far from the boundary of the Tempassuk District, the intentional disturbing of a grave is regarded with the utmost horror, and the punishment of such violation is death. In the Tempassuk, too, as far as I know, such an action would be regarded as an abominable sin. Secondly, it is customary, if the neck of a jar is too small to receive the corpse, to cut the jar into two pieces horizontally. The body is then placed in the bottom half and the top fixed on again with resin.

SACRED STONE AT KINALABU.

At Kinalabu or Penelabu, a hill village of the Tempassuk, I came across the only representation of the human figure which I have seen in Borneo that could by any possibility be called an idol. It consisted of a natural water-worn boulder of greyish stone some $2\frac{1}{2}$ to 3 feet in height, the shape of which accidentally resembled that of a human head and bust. This stone was set up in the ground, and eyes and nose marked upon in with roughly smeared lime. On one side of the figure a slender bamboo post was set in the ground, on the top of which was a small receptacle containing an offering of hens' eggs; both the figure and the receptacle for offerings were enclosed within a bamboo fence. Behind the image were several limpada trees. The natives were extremely reticent concerning the stone, but I suspect that either they thought it was the dwelling-place of the Kenharingen Tumanah or perhaps it had some connection with head-hunting. The natural shape of the boulder would, of course, account for its being chosen as an object of veneration.

SAGIT.

Sagit is a word of very wide significance, which, in some cases, has the meaning of compensation such as may be given in a lawsuit. For instance, a husband whose wife has been insulted by another man may demand sagit from the offender, the amount of the compensation being settled by a council of the older men. Sagit may, however, have a meaning much less easy to define, and I give an example of sagit of this kind as the best means of illustrating its meaning. I was in want of some human hair to restore the scabbard of a parang ilang (a kind of fighting sword), the hair on which had got damaged. While visiting Kampong Tengkurus in the Tempassuk I saw a man wearing long hair and asked him if he were willing to sell it. He replied that he was, and named a price, but said that I must also give him a fowl as "sagit." This fowl would be sacrificed and subsequently taken by the man who performs the ceremony. The object of this is probably to avert any evil consequences which might occur through my having cut off his hair, and also to protect him should I try to make magic with it. He told me that it would not be necessary for him to sacrifice if he cut off his hair of his own accord, as he would not be "breaking custom" (*adat*) of any kind, the wearing of long or short hair being purely a matter of personal taste.

TABUS.

The tabus connected with mentioning one's own name or those of near relations hold good for the Tempassuk as well as Tuaran. The most interesting forms of tabu which I have been able to collect in the former district are those relating to war, which, though somewhat fragmentary, I give below.

War tabus.—(1) When their men are on the war-path their women must not weave cloth or their husbands will be unable to escape from the enemy, because they would become uncertain in which direction to run.

In the weaving of cloth the backwards and forwards movement of the shuttle represents the uncertain movements of a man running first to one side and then to another, in order to escape from an enemy.

(2) Women may not eat from the winnowing basket; for the edges of it represent mountains, over which their men would not be able to climb.

(3) The women must not sit sprawling about or with their legs crossed, else their husbands will not have strength for anything.

On the other hand—

(4) It is lucky for the women to keep walking about, for then the men will have strength to walk far.

A house tabu.—Nobody but the owners may enter a new house before a menghadji has been performed over it.

It may be mentioned here that bunches of leaves which have been used for sweeping out a new house are afterwards suspended from the rafters and carefully preserved.

A village tabu.—If a person dies in a newly built village within six months of its completion it must be abandoned and another site chosen.

Colour tabus.—No one must hold anything white, yellow, or red where a menghadji is in progress.

Nothing white, yellow, or red must be brought into the house when the women are dyeing cloth.

Property tabus.—I was informed that no evil results from supernatural causes are feared by a person infringing a tabu of this kind. Property tabu marks have merely the signification of the English noticeboard, showing that what they are tied to is private property and must not be used by other people. Coconut trees are marked by having bands of grass bound round their trunks, but faggots of thorny brushwood placed at a considerable height from the ground are also employed to prevent thieves from climbing the trees. A number of bamboo sticks set upright in the ground in a circle and bound with a ring of rattan cane are often seen near rivers. These denote that there are fish traps in the stream which are in use by the people of the village, and must not be interfered with by strangers. A pointer of wood attached to the circle of bamboos generally denotes the position of the traps.

Charms.

Nearly all natives make use of charms, and many will not go on a journey without taking some with them as a protection against any perils which they may encounter. Any object of unusual shape, or one which is at all uncommon, is regarded as a charm. Among those which I have seen in use are quartz crystals, shiny black river pebbles, curiously shaped pieces of wood, rhinoceros teeth, fossil shells, and ancient stone implements. Belts of cloth or string network are frequently made to contain such charms as the owner may wish to wear on his person, and

Day of Month.	Name of Day.	Literal meaning of word.	What it implies to the native.	Whether good or bad.	Remarks.
1st	Tonibul...	Same as the 23rd	Animals which eat padi	Good beginning of work	Why good I do not know. The meaning does not sound auspicious.
2nd	Kain duoh	—	—	Good	
3rd	Kain teloh	—	—	"	
4th	Kain apat	—	—	"	
5th	Kain limoh	—	—	"	
6th	Kain onom	—	—	"	
7th	Kain turoh	—	—	Bad	The number seven occurs repeatedly in Dusun legends, and, as in so many other eastern countries, has probably a sacred meaning.
8th	Kain walu	—	—	Good	
9th	Kain siam	—	—	"	
10th	Kain hopod	—	—	"	
11th	Kain hopodomiso	—	—	"	
12th	Kain hopodomduoh	—	—	"	
13th	Kopopusan	Finished out (?)	Finish of good days	"	End of the first set of good days.
14th	Tentelu...	?	?	Bad	
15th	Tawong...	Scanty (?)	Scanty padi	"	
16th	Telekud...	Behind ...	Monkeys come when men are away from padi	"	Behind—in the sense that the monkeys come behind the men's backs.
17th	Tentong	?	Padi sprouts well	Good	
18th	Rampagas	Blighted (?) Bleached (?)	Red sprouts	Bad	
19th	Limbas ...	Not mature (?)...	Cut trees do not die Bananas will not ripen	Good (?)	Good for clearing for Kendinga ; bad for work on Ranau.
20th	Timpun...	Begin (?)	(1) Broken parangs (2) Come let us break parangs (3) Parangs break easily	Bad	Bad for work on Ranau.
21st	Kompusan	Finished, spoilt	Padi walls broken by flood, and water drained off	"	" " "
22nd	Katong ...	Spread out feet	Many potatoes (ubi)	Very bad ...	Meaning, perhaps, many potatoes spread out like feet.
23rd	Geok ...	Maggots	Maggots in padi ...	Bad	
24th	Kain duoh	—	—	Good	
25th	Kain teloh	—	—	"	
26th	Kain apat or gapat	—	—	"	
27th	Kain limoh	—	—	"	
28th	Kopopusan	Finished out (?)	Finish of good days	"	End of second set of good days.
29th	Sikulub	?	Those who work become sick. Those who don't get much padi	Bad	
30th	Tenob ...	—	Monkeys eat padi	"	
31st	Gogor ...	—	Same as for Sikulub	"	

each of these is sewn or netted into a small compartment separate from the others. Stone implements are, among the Dusuns, chiefly used as charms to keep their padi in good condition.

THE DUSUN CALENDAR.

The Dusun has two methods of reckoning his longest divisions of time. If he be a hill man he will reckon by the "taun kendinga" or hill padi season—from planting to harvest, six months; if a plain dweller, by the "taun tanau" or wet padi season—from planting to harvest, eight or nine months. This subject would not come within the scope of the present article were it not for the Dusun month, in which certain days are lucky and others the reverse. On the latter, no work must be done in the padi gardens or the crop will be spoilt, though, sometimes, other things may be done. The month consists of two periods of lucky days and two of unlucky, the last day of each of the good periods being called "kopopusan." With regard to the good days "kain duoh," "kain teloh," etc., "kain" in Malay means cloth, but I could not find out why the days were thus named; "duoh," "teloh," etc., added to the "kain" are merely the numerals 2, 3, etc., in Dusun. With regard to the names of the other days in the annexed table, I give their literal meanings as far as I have been able to obtain them, though, in some cases, their correctness is doubtful. This list of day names was collected at Kampong Tengkurus.

OMEN ANIMALS.

The kijang, the Bornean roe-deer, is an omen animal, and to hear its bark when on a journey is considered unlucky.

The large millipede (*Julus sp.?*), which is so common in Borneo, is considered very unlucky. If a man going on a journey encounters one, either crossing his path or coming to meet him, he will return home and start again the next day.

ADDITIONAL BELIEFS AND CUSTOMS.

The belief in the existence of tailed men is very general, and they are said to be cannibals.

There are legends of giants called Tempulalongoi, but I have been able to gather no information about them.

During epidemics of small-pox, the hill villagers make wooden models of men and spears, and place them in prominent positions on the road by which the disease is supposed to be advancing. These models are said to contain spirits which fight with the spirits of small-pox.

Various marks on buffaloes are considered very unlucky. If an animal has two whorls of hair under the belly something very bad will happen to its owner. A Y-shaped white mark on the neck means that the buffalo will be killed by lightning.

The belief in dreams as a means of divination is very strong, and any warning which may seem to be conveyed by them is scrupulously heeded.

The well-known symbol the swastika may occasionally be seen used as a design in tattooing.

Markets (*tamus*) are instituted with the sacrifice of a buffalo, the blood of which is smeared on a stone. Curses are then pronounced upon anyone who shall violate the tamu by fraud or other evil practices.

A GRAMMAR OF THE MAILU LANGUAGE, PAPUA.

By Rev. W. J. V. Saville, London Missionary Society.

TABLE OF CONTENTS.

Demonstratives.

(Pronominal, Adjectival, and Adverbial.)

This......*eva,* and *ev'* before vowels.

That......*ne* (near in time and place).

nau (distant) in time and place, and refers to something previously mentioned.

ada, ad' (referring to that over there, *cp.* "yon").

These......same as This.

Those......same as That.

Here......*evano* (here it is).

evade (at this place), also *evanade.*

There......*neno* (there it is, also there you are, I said so).

nede (generally out of sight of speaker).

adano (there, in front of your nose), also *adade, adanade,* over there, not necessarily in sight.

Hence......*eva na ma.*

Thence......*nena ma.* *Ada na ma.*

Then......*nena de.*

Nouns.

Nouns are proper, common, and abstract. The first and second are very full in the language, but the third class in many ways is deficient. *Gender* is

distinguished by separate words. Of human beings—*egi*, man; *avesa*, woman. Of animals, other than man—*arabae*, male; *sina*, female. There is no mark for *number* except by the use of phrases, such as *emegi garu*, a lot of men, equivalent this to our English, nothing but men; *emegi* and *egi* are quite interchangeable, whether of one or many men. There seems to be one exception, and that is with the word *oeva*, child, which becomes *ooeva*, children. But even here *oeva seriada* is still correct for all the children. Such words as *garu*, *duba*, *seriada*, and *kawowo ei* used after nouns all imply a number of the thing or person indicated by the noun.

Case is not marked by any sign in the noun itself. The possessive is marked by the pronoun only.

ADJECTIVES.

Adjectives are numerous, and embrace many and varied qualities of abstract ideas, *e.g.*, beautiful, *larema*; horrible, *oreore* and *oreakai*; straight, *orooroni*; crooked, *kiokio*; sweet, *onaro*; bitter, *akakai*.

There is no comparison as such, except by the use of such adverbs with the adjective, as *maato*, a little; or *notioo*, very; or *kawowo*, very, or the essence of.

Any adjective becomes an adverb when the former is infixed in the verb.

All adjectives agree with the subject of the verb in number and case and person, and with the noun they qualify, *e.g.*:—

They were always wrong. *Omoa edeedesineiata.*
Sick men. *Maraisusueseana emegi.*
The houses are always strong. *Uru kisasusuesea.*
The boys always used to be weak. *Tamaru beroberosineiata.*
I and my father are just. *Ia eo nogo ina abai o orooronilagua.*
The pigs are thin. *Boraa selaselalaesea.*
Take the thin pigs away. *Selaselalaeseana boraa evagoniau.*

All adjectives can take the verbal personal suffixes, and so become verbs when the causative *va or v'* is prefixed, *e.g.*:—

Ia vaoroorornilaa. I am making it straight.

PRONOUNS.

Personal.

There are three numbers, singular, dual, and plural, as follows:—

	Singular.	Dual.	Plural.
1st	*ia*	*guadai*	*gea.*
2nd	*ga*	*aeadai*	*aea.*
3rd	*noa*	*omadai*	*omoa.*

There is no gender in pronouns.

Possessive Personal Pronouns.

1st ...	*ina*	*guna*	*geagena, gegena, gena.*
2nd ...	*gana*	*aeadai ana*	*aea ana.*
3rd ...	*ena*	*omadai omana*	*omana.*

These are placed before the noun they govern or agree with. When not used with a noun these possessives can be used with *ea* suffixed to them thus: it is his, *enaea;* it is yours, *ganaea,* etc. It is grammatical also to use simply *ina.*

There are no special pronouns used in relation to foods or foodstuffs.

Interrogatives.

Who ?......*auma ?*
aunoa ? Who is he ?
aumoa ? Who are they ?
Whose ?......*aunoa ena ?*
aumoa omana ?
What ?......*diadara ?* Also *didato.* What do you take me for ? *Didato la seailae-selade i ?*
didara ?
diadaea ?
dia, e.g., dia bioi ? What cup ?
diada, e.g., diada usilaesa ?
Which ?......*abo ?*
Where ?......*abode.*
abo na de (rest at).
abo na la (motion towards).
When ?......*abosamu ?*
diasamu ? (definite).
abo uana ?
dia uana ?
Why ?......*diadama ?*
How ?......*aboua ?*
Whither ?......*abo na la ?*
Whence ?......*abo na ma ?*

Verbs.

Example :—*Isiisi,* to eat.

	Singular.	Dual.	Plural.
Present tense :—I am eating.			
1st person ...	*isilaa*	*isilauta*	*isilasa* or *-laka.*
Excl. person, *i.e.,* 2nd and 3rd...	*isilaesa*	*isilaeseava*	*isiloo.*

	Singular.	Dual.	Plural.

Present habitual:—I habitually (or have always and do at present) eat.

1st person	*isisusuaa* ...	*isisusuauta* ...	*isisusuasa* or *-aka.*
Excl. person, *i.e.*, 2nd and 3rd...	*isisusuesa* ...	*isisusueseava*	*isisusuoo.*

Future indefinite:—I shall eat.

1st person	*isaa*	*isauta* ...	*isesa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isa*	*iseava* ...	*isoo.*

Future habitual:—I shall always eat.

1st person	*isiloisaa* ...	*isiloisauta* ...	*isiloisesa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isiloisa* ...	*isiloiseava* ...	*isiloisoo.*

Near past:—I ate.

1st person	*iaa*	*iauta* ...	*iasa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isaea*... ...	*iseava* ...	*ioo.*

Far past:—I ate.

1st person	*isi-a*... ...	*isiuta* ...	*isisa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isia*	*isiava* ...	*isi-o.*

Past (far, and not including present) habitual:—I always ate.

1st person	*isinei-a* ...	*isineiuta* ...	*isineisa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isineia* ...	*isineiava* ...	*isinei-o.*

Near future:—I shall be eating.

1st person	*isiaa*... ...	*isiauta* ...	*isiasa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isiesa* ...	*isieseava* ...	*isioo.*

Past imperfect:—I was eating.

1st person	*isilonaa* ...	*isilonauta* ...	*isilonasa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isilosa* ...	*isiloseava* ...	*isilonoo* (or *-ao*).

Far past imperfect:—I was eating (a long time ago).

1st person	*isiloi-a* ...	*isiloiuta* ...	*isiloisa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isilosia* ...	*isilosiava* ...	*isiloi-o.*

Also a complete Past to express, for example, "I have already eaten," formed by the prefixing of *va* or *v'* before the above tenses, *e.g.*, *vaiaa*, I have already eaten, or I have finished eating.

Imperative:—Eat.

2nd person	*isiba*	*isibiavai* ...	*isibiau.*

Imperative habitual:—Eat continually.

2nd person	*isilosiba* ...	*isilosibiavai* ...	*isilosibiau.*

Aiai, to come, has an alternative irregular 2nd Sing. Imperative; besides the regular *aiba*, it takes the form *aieni*.

There are a few Imperative words derived from no verbs, as *wai*, give to me; *uma*, take it. (Used when the hand is extended, to give as it were; but the would-be recipient may be looking in another direction.)

Subjunctive:—Let me eat, or I must eat.

1st person	*isaaisi* ...	*isausaisi* ...	*isesaisi.*
Excl. person, *i.e.*, 2nd and 3rd...	*isaisi* ...	*iseavaisi* ...	*isooisi.*

Subjunctive habitual:—Let me always eat, or I must always eat.

1st person	*isiloisaaisi* ...	*isiloisausaisi*...	*isiloisesaisi.*
Excl. person, *i.e.*, 2nd and 3rd...	*isiloisaisi* ...	*isiloiseavaisi*...	*isiloisooisi.*

Conditional.—If the conditional clause relates to something in future time, the suffix *de* is added to the simple future of the verb, and the verb in the dependent clause is also used in the simple form with no extra suffix.

If the conditional clause relates to action in past or habitual time, then the suffixes *de*, *na*, or *ma* (according to the slight difference in the shades of meaning) are added to the termination of the conditional tense in the conditional clause, and the verb in the dependent clause must agree with the verb in the conditional clause, *i.e.*, both verbs are in the conditional tense, but that in the dependent clause has no additional suffix.

E.g., If you will come I will give you tobacco.
Ga aisade kuku gana varo la ia ma minisauta.

If you had come I would have given you tobacco.
Ga aibaeade kuku gana varo la ia ma minibauta.

	Singular.	Dual.	Plural.
1st person	*isibaa(de)* ...	*isibauta(de)* ...	*isibasa(de).*
Excl. person, *i.e.*, 2nd and 3rd...	*isibaea(de)* ...	*isibiava(de)* ...	*isiboo(de).*

Habitual conditional:—If I were in the habit of eating, etc.

1st person	*isilosibaa(de)*	*isilosibauta(de)*	*isilosibasa(de).*
Excl. person, *i.e.*, 2nd and 3rd...	*isilosibaea(de)*	*isilosibiava(de)*	*isilosiboo(de).*

Note.—Although the verbs in both dependent and conditional clauses must be in the conditional mood, they need not be in the same tense, *e.g.*, if you were in the habit of coming you should have eaten now. *Ga ailosibaeade nogo evaeva bua isibaea.* All verbs in the conditional sentence must be in the conditional mood, in both clauses.

N.B.—We find, then, three tenses in the conditional mood, viz., future, past, and habitual. And again each of these has three different forms, according as the suffix in the conditional clause is *de* (true conditional suffix) or *na* (temporal condition) or *ma* (intentional).

The simple future conditional is formed by the suffix *de*, added to the simple future indicative, and followed in the dependent clause by the simple future without suffix.

E.g., If I come back I shall eat. *Ia aieroisaade isaa.*

Temporal.—When I come back I shall eat. *Ia aieroisaana isaa.*

Intentional.—I shall come back to eat. *Ia aieroisaama isaa.*

Exactly the same also with the habitual tense.

The past conditional is more difficult and intricate in its employment of these three suffixes.

N.B.—The suffix *de* added to the verb in the conditional past tense in the conditional clause signifies condition pure and simple.

E.g., If I had come back I should have eaten (but the food was gone). *Ia aierosibaade isibaa.*

The suffix *na* added to the verb in the conditional tense in the conditional clause, while implying condition means really temporal condition, *e.g.*, when I came back I was to have eaten (but the food has gone). *Ia aierosibaana isibaa.*

The suffix *ma* added to the verb in the past conditional tense in the conditional clause implies intention.

E.g., *Ia aierosibaama isibaa.* I was to have come back and eaten (but the food has gone).

N.B.—To illustrate statement above, that all verbs in both clauses in conditional statements, however long the harangue may be, must be put into the conditional mood, *e.g.*, if I had only come back I should have eaten; indeed we should all have eaten together, but you have stolen my food and have eaten it all up yourselves. *Ia aierosibaade isibaa, nogo egena ei gea seriada nogo isinonoisibasa, nogo ia ina isiisi aea ma omasiboona eidema nogo ana woi bua isiapusiboo.*

Subjunctival conditional:—Would that I had eaten; or, If only I had eaten, If only I might eat; or, I ought to have eaten, Oh, would that I might eat.

	Singular.	Dual.	Plural.
1st person	*isibaaisi* ...	*isibautaisi* ...	*isibasaisi.*
Excl. person, *i.e.*, 2nd and 3rd...	*isibaeaisi* ...	*isibiavaisi* ...	*isibooisi.*

Habitual subjunctival conditional:—If only I might always eat.

1st person	*isilosibaaisi* ...	*isilosibautaisi*	*isilosibasaisi.*
Excl. person, *i.e.*, 2nd and 3rd...	*isilosibaeaisi*...	*isilosibiavaisi*	*isilosibooisi.*

Progressive sense in the verb.—This is more especially used with verbs that imply motion, and with other verbs implies the approach of completion or of being finished, *e.g.*, *kokoaowoniesa*, it is getting finished (water in tank, for instance). This sense in the verb is given to it by the infix *-w-* between the stem of the principal verb and *-oni* to go, on to which are added the personal suffixes. The *-w-* is the causative particle *va* or *v'* pronounced always in this

connection as a *w*. It amounts then to another imperfect for the verb, in the different tenses of time.

	Singular.	Dual.	Plural.
Near future:—In this sense the tense is at present.			
1st person	*isiowoniaa* ...	*isiowoniauka*	*isiowoniasa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isiowoniesa* ...	*isiowonieseava*	*isiowonioo.*
Future.			
1st person	*isiowonisaa* ...	*isiowonisauka*	*isiowonisesa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isiowonisa* ...	*isiowoniseava*	*isiowonisoo.*
Far past.			
1st person	*isiowonia* ...	*isiowoniuka* ..	*isiowonisa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isiowonia* ...	*isiowoniava* ...	*isiowoni-o.*
Near past.			
1st person	*isiowonaa* ...	*isiowonauka*...	*isiowonasa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isiowona* ...	*isiowoneava* ...	*isiowonoo.*

The imperfect tenses of the verb cannot be used with this form as they themselves take of the nature of imperfect action, nor can this form be used with the addition of the habitual infix, but in the *subjunctive* as follows:—

1st person	*isiowonisaaisi*	*isiowonisautaisi*	*isiowonisesaisi.*
Excl. person, *i.e.*, 2nd and 3rd...	*isiowonisaisi*	*isiowoniseavaisi*	*isiowonisooisi.*

Note.—In its progressive tenses the verb *aiai* to come is a slight exception in this connection:—*e.g.*,

Present, *aioaiaa.*
Future, *aioaisaa.*
Near past, *aioainaa.*
Far past, *aiowai–a.*

Another form of progressive used with an extra infix *-ero-* signifying "back" or "instead." Suppose, for instance, that I was to send a boy away on some errand, and into another boy's care I gave former's food, to be eaten on his return. I wait a long time, and so does the second boy; then I go down and ask him if the other has not yet returned. He says no; but I say, where is his food. The boy replies that tired of waiting he is now eating it up himself.

Present.			
1st person	*isierooaiaa* ...	*isierooaiauka*	*isierooaiasa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isierooaiesa* ...	*isierooaieseava*	*isierooaioo.*
Near past.			
1st person	*isierooainaa* ...	*isierooainauka*	*isierooainasa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isierooaina* ...	*isierooaineava*	*isierooainoo.*

	Singular.	Dual.	Plural.
	Future.		
1st person	*isierooaisaa* ...	*isierooaisauka*	*isierooaisesa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isierooaisa* ...	*isierooaiseava*	*isierooaisoo.*
	Far past.		
1st person	*isieroowai-a* ..	*isieroowaiuka*	*isieroowaisa.*
Excl. person, *i.e.*, 2nd and 3rd...	*isieroowaia* ...	*isieroowaiava*	*isieroowai-o.*
	Subjunctive.		
1st person	*isierooaisaaisi*	*isierooaisautaisi*	*isierooaisesaisi.*
Excl. person, *i.e.*, 2nd and 3rd...	*isierooaisaisi*	*isierooaiseavaisi*	*isierooaisooisi.*

Note.—Besides the possibility of and the constant use of the above tenses in both forms of the above progressive moods, they can be used also in imperative and conditional, and subjunctival conditional moods. But as the verbal suffixes are the same in all persons as those of the regular verb in conditional, etc., I will instance only the singular in the conditional, but imperative in full.

Imperative.

2nd person	*isiowoniba* ...	*isiowonibiavai* ...	*isiowonibiau.*
	isieroowaiba ...	*isieroowaibiavai* ...	*isieroowaibiau.*

Past conditional.

1st person ... ... *isiowonibaa(de).*
isieroowaibaea(de).
isiowonibaea(de).
isieroowaibaea(de)

etc., and other persons as in the personal suffixes of conditional proper.

Subjunctival conditional.

1st person ... ... *isiowonibaaisi.*
isieroowaibaaisi.
Excl. person, *i.e.*, 2nd and 3rd... *isiowonibaeaisi.*
isieroowaibaeaisi

etc., etc., for other persons.

Note.—Suppose that I was leaving a native while he was in the act of eating and I wished to say "good-bye," I should say to him *isiowoniba*; he would say to me *oniowoniba*.

But "good-night" (they have not begun to sleep yet), I should say *uilosibiau*, "sleep you," implying without being disturbed. They would reply *E, uilosiba*.

Isieroowaibiavai means "you two eat it up," implying that they two have waited long enough for the third person, and the food had better not be wasted.

Isiowonisaaisi means "let me go on eating."

Isieroowaibaade means "if I had gone on eating" (implying, perhaps, that it would not have been wasted, that is, the food that was intended for another, but for whom I was tired of waiting).

Notes.—*Va* or *v'* as a prefix to the verb implies a sense of completion, or "already." This is also the causative.

Cf. *v'ainaa,* I have come, *i.e.*, I have already come.
vaiaa, I have already eaten.
vaeboebolasa, we are making it good.
vausi, he has done it.
vakokoasa, it is finished.
vakisa, make strong.
vaeribilai, show it to me.
vanani, to teach, *i.e.*, to cause to hear.
vavegarai, to teach, *i.e.*, to cause to know.
vauaa, I have already done (it), *va* and *usiusi,* to do.

The Mailu verb has two forms of personal suffixes, viz., subjectival and objectival. The subjectival form agrees with the subject of the verb in number and person. The objectival form agrees with the object also in person and number, *except when the objectival person is that of the third person singular, in which case the verb always takes the subjectival suffix.*

Form 1. SUBJECTIVAL SUFFIXES TO THE VERB.

	Inclusive Person. (1st Person.)	Exclusive Person. (2nd and 3rd Persons.)
Singular	*-aa, -a*	*-esa, -a, -sia.*
Dual	*-auka* or *-auta* *-uta,* or *-uka*	*-eseava, -eava, -siava, -iava.*
Plural	*-asa, -sa*	*-o, -oo,* or *-ao.*

Note.—Form 1 is used quite regularly beyond the tense insertions *-s, -la-,* or *-isi-*.

Form 2. OBJECTIVAL SUFFIXES TO THE VERB.

	Inclusive.	Exclusive.
Singular	*-esela, -ela, -la*	*-aga, -ga* (excl. 2nd sing. *only*) used with any of the personal pronouns as subject of the verb *except* the 1st person singular as subject, then use *-auta, -uta.*

	Inclusive.	Exclusive.
Dual	*-agua, -gua*	*-sea* (with all persons as subject except 1st person singular, then use *-seaa*). *-ea*, with any person as subject except 1st person singular, then *-eaa*. *-eata, -iata* (past tenses), with any person as subject except 1st person singular, then use *-eaa, -iaa*. Note.— *-eata* is an alternative form for *-ea*.
Plural	*-agia, -gia*	The same as in the case of the Dual.

These forms are quite regular.

N.B.—1. 3rd person singular pronoun has no special objectival verbal suffix of its own, therefore with the 3rd person singular as object, the verb takes the *subjectival suffix* only.

2. 1st person singular pronoun as subject takes exceptional objectival suffixes with the verb governing other persons. (See above.)

3. Exclusive 2nd singular has two forms of objectival suffix with the verb, according as the subject of verb is 1st person singular (in which case the objectival suffix is *–auta, –uta*) or the subject be any other person or number (in which cases the objectival suffix is always *–aga, –ga*).

4. The fact that a tense is present, future, near past, or distant past alters the form of the objectival suffix slightly. (See above.)

Minimini......To give.

Transitive, governing two objects.

1.	Present.	Present Habitual, Including Past.	Future.
I am giving thee tobacco ...	*minilauta* ...	*minisusuauta*	*minisauta.*
I......him	*minilaa* ...	*minisusuaa* ...	*minisaa.*
I......you two...	*minilaeseaa* ...	*minisusueseaa*	*miniseaa.*
I......you (plural)	" ...	"	"
I......them two	" ...	"	"
I......them	" ...	"	"

	Present.	Present Habitual, Including Past.	Future.
2.			
Thou......me	*minilaesela* ...	*minisusuesela*	*minisela.*
Thou......him	*minilaesa* ...	*minisusuesa* ...	*minisa.*
Thou......us two	*minilagua* ...	*minisusuagua*	*minisagua.*
Thou......us	*minilagia* ...	*minisusuagia*	*minisagia.*
Thou......them two	*minilaesea* ...	*minisusuesea*	*minisea.*
Thou......them	" ...	"	"
3.			
He......me	*minilaesela* ...	*minisusuesela*	*minisela.*
He......us two	*minilagua* ...	*minisusuagua*	*minisagua.*
He......us	*minilagia* ...	*minisusuagia*	*minisagia.*
He......him	*minilaesa* ...	*minisusuesa* ..	*minisa.*
He.. ...thee	*minilaga* ...	*minisusuaga*...	*minisaga.*
He......you two, you (plural), them two, them.	*minilaesea* ...	*minisusuesea*	*minisea.*
4.			
We two......thee	*minilauta* ...	*minisusuauta*	*minisauta*
(*-lauta* here is subjectival *not* objectival suffix).	or, *-lauka*... or, *-louta*...	or, *-auka* ...	or *-sauka.*
We two......him	as above ...	as above ..	as above.
We two......you two	*minilaesea* ...	*minisusuesea*	*minisea.*
We two......you	" ...	"	"
We two......them two ...	" ...	"	"
We two......them	" ...	"	"
5.			
You two......me	*minilaesela* ...	*minisusuesela*	*minisela.*
You two......us two	*minilagua* ...	*minisusuagua*	*minisagua.*
You two......us	*minilagia* ...	*minisusuagia*	*minisagia.*
You two......him	*mini*laeseava	*minisusu*eseava	*mini*seava.
You two......them two ...	*minilaesea* ...	*minisusuesea*	*minisea.*
You two......them	" ...	"	"
6.			
They two......me	the same as No. 5 in each tense.		
They two......us two	" "	" "	
They two......us	" "	" "	
They two......thee	*minilaga* ...	*minisusuaga*...	*minisaga.*
They two......you two ...	*minilaesea* ...	*minisusuesea*...	*minisea.*
They two......you	" ...	" ...	"

6.—Contd.—	Present.	Present Habitual, Including Past.	Future.
They two......him	the same as No. 5 in each tense.		
They two......them two ...	„ „	„ „	
They two......them	„ „	„ „	

7.

We are giving thee	*minilaga* ...	*minisusuaga*	*minisaga.*
„ „ him	*minilasa* ...	*minisusuasa*	*minisesa.*
„ „ you two ...	*minilaesea* ...	*minisusuesea*	*minisea.*
„ „ you	„ ...	„	„
„ „ them two ...	„ ...	„	„
„ „ them	„ ...	„	„

8.

You (plural) are giving me ...	*minilaesela* ...	*minisusuesela*	*minisela.*
„ „ „ us two	*minilagua* ...	*minisusuagua*	*minisagua.*
„ „ „ us ...	*minilagia* ...	*minisusuagia*	*minisagia.*
„ „ „ him ...	*miniloo* ...	*minisusuoo* ...	*minisoo.*
„ „ „ them two	*minilaesea* ...	*minisusuesea*	*minisea.*
„ „ „ them	„ ...	„	„

9.

They are giving me	the same as 8.		
„ „ us two ...	„ „ „		
„ „ us	„ „ „		
„ „ thee	*minilaga* ...	*minisusuaga*	*minisaga.*
„ „ you two ...	*minilaesea* ...	*minisusuesea*	*minisea.*
„ „ you	„ ...	„	„
„ „ them ...	„ ...	„	„
„ „ them two ...	„ ...	„	„

10. Imperative.

	Singular.	Dual.	Plural.
Give simple	*miniba* ...	*minibiavai* ...	*minibiau.*
Give me	*minibilai* or *minilai*	*minibilai* or *minilai*	*minibilai* or *minilai.*
„ us two	*minibaguai* ...	*minibaguai* ...	*minibaguai.*
„ us	*minibagiai* ...	*minibagiai* ...	*minibagiai.*
„ him	*miniba* ...	*minibiavai* ...	*minibiau.*
„ them two	*minibiai* ...	*minibiai* ...	*minibiai.*
„ them	„ ...	„ ...	„

Note.—In the case of most verbs, whether transitive or intransitive, mostly, I suppose, for the sake of euphony, *si* is inserted after the stem of the verb and before the suffix, *e.g.*, in the imperative of *keakea*, to hit, all of you hit him, *keasibiau;* hit me, *keasibilai;* hit him, *keasiba.* This *si* does not only belong to the imperative. It is used largely in the indicative mood for euphony, in the distant past, simple, and habitual: *e.g.*, he called, *kotusia;* you two called, *kotusiava;* I used to walk, *ia baesinei-a;* he called them, *kotusiata.* This *si* is seldom found where the stem of the verb ends in *i*, as in the case of *minimini*, to give.

Transitive example:—*Minimini*, to give.

11.

	Future Habitual.	Near Past.	Far Past.
I will always give thee	*miniloisauta*	*minauta* ...	*miniuta.*
„ „ „ you two ...	*loiseaa* ...	*mineaa* ...	*miniaa.*
„ „ „ you (plural)...	„ ...	„ ...	„
„ „ „ him	*loisaa* ...	*minaa* ...	*mini-a.*
„ „ „ them two ...	*loiseaa* ...	*mineaa* ...	*miniaa.*
„ „ „ them ...	„ ...	„ ...	„

12.

	Future Habitual.	Near Past.	Far Past.
Thou wilt always give me ...	*miniloisela* ...	*minela* ...	*minila.*
„ „ „ us two ...	*loisagua*	*minagua* ...	*minigua.*
„ „ „ us ...	*loisagia*	*minagia* ...	*minigia.*
„ „ „ him ...	*loisa* ...	*minaea* ...	*minia.*
„ „ „ them two	*loisea* ...	*minea* ...	*miniata.*
„ „ „ them ...	„ ...	„ ...	„

13.

	Future Habitual.	Near Past.	Far Past.
He will always give me... ...	*miniloisela* ...	*minela* ...	*minila.*
„ „ „ us two ...	*loisagua*	*minagua* ...	*minigua.*
„ „ „ us	*loisagia*	*minagia* ...	*minigia.*
„ „ „ thee ...	*loisaga*	*minaga* ...	*miniga.*
„ „ „ you two ...	*loisea* ...	*minea* ...	*miniata.*
„ „ „ you ...	„ ...	„ ...	„
„ „ „ him ...	*loisa* ...	*minaea* ...	*minia.*
„ „ „ them two ...	*loisea* ...	*minea* ...	*miniata.*
„ „ „ them ...	„ ...	„ ...	„

14.

	Future Habitual.	Near Past.	Far Past.
We two will always give thee ...	*miniloisaga* ...	*minaga* ...	*miniga.*
„ „ „ „ you two	*loisea* ...	*minea* ...	*miniata.*
„ „ „ „ you ...	„ ...	„ ...	„

	Future Habitual.	Near Past.	Far Past.
We two will always give him ...	*miniloisauka* or *-ta.*	*minauka* or *-ta*	*miniuka* or *-ta.*
" " " " them two	*loisea* ...	*minea* ...	*miniata.*
" " " " them	" ...	" ...	"

15.

You two will always give me ...	*miniloisela* ...	*minela* ...	*minila.*
" " " " us two	*loisagua*	*minagua* ...	*minigua.*
" " " " us ...	*loisagia*	*minagia* ...	*minigia.*
" " " " him ...	*loiseava*	*mineava* ...	*miniava.*
" " " " them two	*loisea* ...	*minea* ...	*miniata.*
" " " " them ...	" ...	" ...	"

16.

They two will always give me, etc., in all cases the same as 15.

17.

We will always give thee ...	*miniloisaga* ...	*minaga* ...	*miniga.*
" " " you two ...	*loisea* ...	*minea* ...	*miniata.*
" " " you ...	" ...	" ...	"
" " " him ...	*loisesa* ..	*minasa* ...	*minisa.*
" " " them two	*loisea* ...	*minea* ...	*miniata.*
" " " them ...	" ...	" ...	"

18.

You (plural) will always give me	*miniloisela* ...	*minela* ...	*minila.*
" " " " us two	*loisagua*	*minagua* ...	*minigua.*
" " " " us...	*loisagia*	*minagia* ...	*minigia.*
" " " " him	*loisoo* or *-ao*	*minoo* or *-ao*	*mini-o.*
" " " " them two	*loisea* ...	*minea* ...	*miniata.*
" " " " them	" ...	" ...	"

19.

They will always give me, etc., in three tenses as above. same as 18.

20.

I am always giving thee, etc., I used always to give thee, etc.

	Near Past Habitual and Including Present Time.	Far Past Habitual and complete in past, or action finished in past time.
I am always giving thee	*minisusuauta*...	*minineiuta.*
" " you two	*susueseaa*	*neiaa.*
" " you (plural)...	"	"

	Near Past Habitual and Including Present Time.	Far Past Habitual and complete in past, or action finished in past time.
I am always giving him	*minisusuaa*	*mininei-a.*
„ „ „ them two	*susueseaa*	*neiaa.*
„ „ „ them	„	„
21.		
You (singular) are always giving me	*minisusuesela*	*minineila.*
„ „ „ „ us two	*susuagua*	*neigua.*
„ „ „ „ us	*susuagia*	*neigia.*
„ „ „ „ him	*susuesa*	*neia.*
„ „ „ „ them two	*susuesea*	*neiata.*
„ „ „ „ them	„	„
22.		
He is always giving me	*minisusuesela*	*minineila.*
„ „ „ us two	*susuagua*	*neigua.*
„ „ „ us	*susuagia*	*neigia.*
„ „ „ thee	*susuaga*	*neiga.*
„ „ „ you two	*susuesea*	*neiata.*
„ „ „ you	„	„
„ „ „ him	*susuesa*	*neia.*
„ „ „ them two	*susuesea*	*neiata.*
„ „ „ them	„	„
23.		
We two are always giving thee	*minisusuaga*	*minineiga.*
„ „ „ you two	*susuesea*	*neiata.*
„ „ „ you	„	„
„ „ „ him	*susuauka* or *-ta.*	*neiuka* or *-ta.*
„ „ „ them	*susuesea*	*neiata.*
„ „ „ them two	„	„
24.		
You two are giving (always) me	*minisusuesela*	*minineila.*
„ „ „ us two	*susuagua*	*neigua.*
„ „ „ us	*susuagia*	*neigia.*
„ „ „ him	*susueseava*	*neiava.*
„ „ „ them two and them	*susuesea*	*neiata.*
25.		
They two are always giving me	*minisusuesela*	*minineila.*
„ „ „ us two	*susuagua*	*neigua.*

	Near Past Habitual and Including Present Time.	Far Past Habitual and complete in past, or action finished in past time.
They two are always giving us	*minisusuagia*...	*minineigia.*
,, ,, ,, thee	*susuaga* ...	*neiga.*
,, ,, ,, you two and you...	*susuesea*	*neiata.*
,, ,, ,, him	*susueseava*	*neiava.*
,, ,, ,, them two and them	*susuesea* ...	*neiata*

26.

We are always giving thee	*minisusuaga* ...	*minineiga.*
,, ,, ,, you two	*susuesea* ...	*neiata.*
,, ,, ,, you (plural)	,, ...	,,
,, ,, ,, him	*susuasa* ...	*neisa.*
,, ,, ,, them two and them ...	*susuesea* ...	*neiata.*

27.

You (plural) are always giving me	*minisusuesela*	*minineila.*
,, ,, ,, ,, us two	*susuagua*	*neigua.*
,, ,, ,, ,, us	*susuagia*...	*neigia.*
,, ,, ,, ,, him	*susuoo* ...	*nei-o.*
,, ,, ,, ,, them two and them	*susuesea* ...	*neiata.*

28.

They are always giving me	*minisusuesela*...	*minineila.*
,, ,, ,, us two	*susuagua*	*neigua.*
,, ,, ,, us	*susuagia*...	*neigia.*
,, ,, ,, thee	*susuaga* ...	*neiga.*
,, ,, ,, you two and you (plural)	*susuesea* ...	*neiata.*
,, ,, ,, them two and them ...	,,	,,

29.

Imperative.—Simple with personal object.

	Singular, *i.e.*, (thou) give.	Dual.	Plural, *i.e.*, (you) give.
Give me	*minibilai* or *minilai*,	same dual and plural as singular.	
,, us two	*minibaguai* ...	,, ,,	,, ,,
,, us	*minibagiai* ...	,, ,,	,, ,,
,, him	*miniba*	*minibiavai* ...	*minibiau*, or *miniau.*
,, them two and them	*minibiai*	same dual and plural as singular.	

30.

Imperative habitual, i.e., give always.

This is formed by the insertion of *-losi-* between the stem of the verb and the final suffix.

	Future Perfect.	Past Imperfect. I was giving thee.	Far past Imperfect. I was giving thee (distant).
31.			
I shall have given thee	*miniesauta* ...	*minilonauta* ...	*miniloiuta.*
" " " you two ...	*eseaa* ...	*loseaa* ...	*loiaa.*
" " " you (plural)...	*eseaa* ...	*loseaa* ...	*loiaa.*
" " " him	*aa* ...	*lonaa* ...	*loi-a.*
" " " them two ...	*eseaa* ...	*loseaa* ...	*loiaa.*
" " " them ...	*eseaa* ...	*loseaa* ...	*loiaa.*
32.			
Thou wilt have given me ...	*esela* ...	*losela* ...	*losila.*
" " " us two ...	*esagua* ...	*lonagua*...	*loigua.*
" " " us ...	*esagia* ...	*lonagia* ...	*loigia.*
" " " him ...	*esa* ...	*losa* ...	*loia.*
" " " them two	*esea* ...	*losea* ...	*losiata.*
" " " them ...	" ...	" ...	"
33.			
He will have given me	*esela* ...	*losela* ...	*losila.*
" " " us two ...	*esagua* ...	*lonagua*	*loigua.*
" " " us	*esagia* ..	*lonagia* ...	*loigia.*
" " " thee ...	*esaga* ...	*lonaga* ...	*loiga.*
" " " you (plural) and you two	*esea* ...	*losea* ...	*losiata.*
34.			
We two will have given thee ...	*esaga* ...	*lonaga* ...	*loiga.*
" " " " you and you two	*esea* ...	*losea* ...	*losiata.*
" " " " him ...	*esauka* or *-ta*	*lonauka* or *-ta* ...	*loiuka* or *-ta.*
" " " " them and them two	*esea* ...	*losea* ...	*losiata.*
35.			
You two will have given me ...	*esela* ...	*losela* ...	*losila.*
" " " " us two	*esagua* ...	*lonagua*	*loigua.*
" " " " us ...	*esagia* ...	*lonagia* ...	*loigia.*
" " " " him ...	*eseava* ...	*loseava* ...	*losiava.*
" " " " them two and them	*esea* ...	*losea* ...	*losiata.*

	Future Perfect.	Past Imperfect. They two were giving me, etc.	Far Past Imperfect. They two were giving me, etc. (distant).
36.			
They two will have given me ...	*miniesela* ...	*minilosela* ...	*minilosila.*
" " " " us two	*esagua* ...	*lonagua*...	*loigua.*
" " " " us ...	*esagia* ...	*lonagia* ...	*loigia.*
" " " " thee...	*esaga* ...	*lonaga* ...	*loiga.*
" " " " him ...	*eseava* ...	*loseava* ...	*losiava.*
" " " " them two and them	*esea* ...	*losea* ...	*losiata.*
37.			
We shall have given thee ...	*esaga* ...	*lonaga* ...	*loiga.*
" " " you and you two ...	*esea* ...	*losea* ...	*losiata.*
" " " him ...	*asa* ...	*lonasa* ...	*loisa.*
" " " them two and them ...	*esea* ...	*losea* ...	*losiata.*
38.			
You (plural) will have given me	*esela* ...	*losela* ...	*losila.*
" " " " " us two	*esagua* ...	*lonagua*	*loigua.*
" " " " " us...	*esagia* ...	*lonagia* ..	*loigia.*
" " " " " him	*eseava* ...	*loseava* ...	*losiava.*
" " " " " them two and them	*esea* ...	*losea* ...	*losiata.*
39.			
They will have given me ...	*esela* ...	*losela* ...	*losila.*
" " " us two ...	*esagua* ...	*lonagua*	*loigua.*
" " " us	*esagia* ...	*lonagia*...	*loigia.*
" " " thee ...	*esaga* ...	*lonaga* ...	*loiga.*
" " " him ...	*eseava* ...	*loseava* ...	*losiava.*
" " " you two and you ...	*esea* ...	*losea* ...	*losiata.*
" " " them two and them	" ...	" ...	"

	Subjunctive.	Conditional (past). If I had given thee, etc.
40.		
I must give thee	*minisautaisi* ...	*minibautade.*
" " you and you two	*seaaisi* ...	*biaade.*

	Subjunctive.	Conditional (past).
		If I had given him, etc.
I must give him	*minisaaisi* ...	*minibaade.*
„ „ them two and them	*seaaisi* ...	*biaade.*

41.

Thou must give me	*selaisi* ...	*bilade.*
„ „ „ us two	*saguaisi* ...	*baguade.*
„ „ „ us	*sagiaisi* ...	*bagiade.*
„ „ „ him	*saisi* ...	*baeade.*
„ „ „ them two and them	*seaisi* ...	*biade.*

42.

He must give me	*selaisi* ...	*bilade.*
„ „ us two	*saguaisi* ...	*baguade.*
„ „ us	*sagiaisi* ...	*bagiade*
„ „ thee	*sagaisi* ...	*bagade.*
„ „ you two and you	*seaisi* ...	*biade.*
„ „ him	*saisi* ...	*baeade.*
„ „ them two and them	*seaisi* ...	*biade.*

43.

We two must give thee	*sagaisi* ...	*bagade.*
„ „ „ you two and you	*seaisi* ...	*biade.*
„ „ „ him	*saukaisi* ...	*baukade.*
„ „ „ them two and them ...	*seaisi* ...	*biade.*

44.

You two must give me	*selaisi* ...	*bilade.*
„ „ „ us two	*saguaisi* ...	*baguade.*
„ „ „ us	*sagiaisi* ...	*bagiade.*
„ „ „ him	*seavaisi* ...	*biavade.*
„ „ „ them two and them ...	*seaisi* ...	*biade.*

45.

They two must give me	*selaisi* ...	*bilade.*
„ „ „ us two	*saguaisi* ...	*baguade.*
„ „ „ us	*sagiaisi* ...	*bagiade.*
„ „ „ thee	*sagaisi* ...	*bagade.*
„ „ „ you and you two	*seaisi* ...	*biade.*
„ „ „ him	*seavaisi* ...	*biavade.*
„ „ „ them two and them ...	*seaisi* ...	*biade.*

		Subjunctive.	Conditional (past). If we had given thee, etc.
46.			
We must give thee	… … … …	*minisagaisi* …	*minibagade.*
„ „ „ you and you two…	… …	*seaisi* …	*biade.*
„ „ „ him	… … … …	*sesaisi* …	*basade.*
„ „ „ them two and them	… …	*seaisi* …	*biade.*
47.			
You (plural) must give me	… … …	*selaisi* …	*bilade.*
„ „ „ „ us two	… … …	*saguaisi* …	*baguade.*
„ „ „ „ us	… … …	*sagiaisi* …	*bagiade.*
„ „ „ „ him	… … …	*sooisi* …	*boode.*
„ „ „ „ them two and them	…	*seaisi* …	*biade.*
48.			
They must give me	… … … …	*selaisi* …	*bilade.*
„ „ „ us two	… … … …	*saguaisi* …	*baguade.*
„ „ „ us	… … … …	*sagiaisi* …	*bagiade.*
„ „ „ thee	… … … …	*sagaisi* …	*bagade.*
„ „ „ you two and you	… …	*seaisi* …	*biade.*
„ „ „ him	… … … …	*sooisi* …	*boode.*
„ „ „ them two and them	… …	*seaisi* …	*biade.*

N.B.—The subjunctive habitual and the past conditional habitual tenses are formed in the following regular way:—The subjunctive habitual by the insertion of *-loi-* between the verbal stem and the *-s-*, which is the prefix before the verbal personal ending, *e.g.*, *miniloiselaisi.* The past conditional habitual, by the insertion of *-losi-* regularly between the verbal stem and the personal suffix, *e.g.*, *minilosibilade.* The remarks relating to the conditional mood, made before with regard to present, future, etc., tenses of the conditional mood, being formed by the addition of *de* to the simple personal suffix of the verb, hold good also where the personal objective suffix is added. In those cases, *i.e.*, future and present and future perfect, the *de* is added to the objective personal suffix in the conditional clause without altering the form at all. The dependent clause has no mark of distinction from simple future or perfect future tenses. Examples:—

If you will come to my house I will give you tobacco. *Ia ina uru la ga aisade nogo gana la kuku ia ma minisauta* (singular).

If you were in the habit of giving me food I would always have given you tobacco. *Isiisi ia na la ga minilosibilade nogo gana la kuku ia ma minilosibauta.*

Verb Intentional:—

Present—*Isaaisi usilaana noa aiesa.* I am about to eat and he is coming.

Future—*Isaaisi usiloisaana noa aisa.* When I shall be about to eat he will come.

Verb Intentional (contd.):—

Near past—*Isaaisi uaana noa aina.* When I was about to eat he came.

Far past—*Isaaisi usiana noa aia.* When I was about to eat he came (far past).

Habitual—*Isiloisaaisi usisusuaana noa aisusuesa.* When I am always about to eat he always comes.

Far past habitual—*Isiloisaaisi usineiana noa aineia.* Whenever I used to be about to eat he always came.

Future perfect—*Isaaisi usiaana noa aiesa.* When I shall have been about to eat he will have come.

Past imperfect—*Isaaisi usilonaana noa aina.* When I was going to eat he came.

Far past imperfect—*Isaaisi usiloiana ailosia.* When I was going to eat he came (far past).

The conditional intentional is formed in exactly the same way in the present and future tenses, with of course the conditional particle *de* suffixed to the personal suffixes in the regular way, but the past conditional intentional would be as follows:—

Past Conditional Intentional—

Isaaisi usibaade noa aibaea. If I had been about to eat he would have come.

Habitual Past Conditional Intentional—

Isaaisi usilosibaade noa ailosibaea. If I had always been about to eat he would have always come.

The above only shows the first person singular, but of course the same holds good for all persons, and governs personal pronouns in the objective case just as in the paradigm of the regular verb—*e.g., Miniselaisi usilosana ga aina.* He was about to give me when you came.

Note well also—

Isibaaisi uaana ga aina. Would that you had come when I was about to eat.

Isibasaisi uasana ga aina. If only (or would that) you would come when we were about to eat.

And so on also with habitual and all persons.

Sentences illustrating the use of Intentional Verb:—

1. When we were about to eat, the Merrie England came. *Gea isesaisi usisana* "Merrie England" *aia.*
2. I was just going to give you tobacco when you went. *Ia ma gana la kuku minisautaisi uaana nogo ga onaea.*

Sentences illustrating the use of Intentional Verb (*contd.*) :—

3. I was cross at your coming when I was about to eat (near past). *Ia isaaisi uaana ga aina de unari ararasela.*
4. He will be cross if you come when he is about to give them tobacco. *Noa ma omana la kuku miniseaisi usana ga aisa de noa unari araraisa.*
5. We were pleased at his coming when we were about to pay them. *Gea omana la sipo miniseaisi usisana noa aia de nogo ameloigia.*
6. Why do you always come when I am about to eat? *Ia isaaisi usisusuaana ga didara aisusuesa i?*
7. You came when I wanted to eat. *Ia isaaisi sunanaana ga aina.*
8. If you come when we are about to eat we shall be wild with you (singular). *Gea isesaisi usiasana ga aiesa de gea unari araraiminisaga.*
9. If you had come when we were about to eat we should have been wild with you (but you did not). *Gea isesaisi usibasana ga aibaea de gea ma unari araraiminibaga.*
10. If the ship had been in the habit of coming when we were about to eat we should have been cross (but it was not). *Gea isiloisesaisi usilosibasana, orou aibaea de gea ma unari araralosibagia.*
11. May the ship not come when I am about to go to sleep. *Ia uisaaisi usibaana orou d'aibaea.*

From the foregoing it will be seen that the intentional verb is made up of the subjunctive of the principal verb of the sentence followed by the auxiliary verb *usiusi*, to do, in any person and tense of indicative or conditional moods, with the participial particle *na* suffixed to the personal suffix.

In the sentences above, with careful parsing, each tense and person can easily be traced, and with instructive profit.

E.g., *uaana* :—

First person singular, perfect tense, near past, indicative mood with participial particle added. From the auxiliary verb *usiusi*, to do.

E.g., *usisana* :—

First person, plural number, perfect far past, indicative mood, used in auxiliary sense from the verb *usiusi*, to do, and agreeing with its subject *gea*.

It may be well to point out that the imperfect implying infix *l*, say of the present and near past imperfect, is *lo* with some people in one and the same village, so that it becomes an alternative form, and in the present they might say *isiloaa*, and in the imperfect *isiloanaa*, making still again an infix of an extra *a*. But the most regular method is that that I have set out, and will be universally understood even by those who in this district speak this language, but with slightly different tense infixes but the same personal suffixes.

The sense of continuance in the verb is expressed by the prefixing of the particle *adi* before the verb in any of its numerous moods, tenses, and persons, *e.g.*:—

I am still standing. *Ia adi idalaa.*

We will still be standing. *Gea adi idaloisesa.*

Is he still eating? *Noa adi isilaesa i?*

We two were still eating. *Guadai adi isilonauka.*

They are still eating. *Omoa adi isiloo.*

Note.—A very interesting form of the verb is found to express such a sense as "suppose for instance such and such"; it must come out of the abundantly useful conditional form of our verb, *e.g.*:—

Suppose a woman was to give food to her child, etc. *Avesa omu na ma ena oeva na la isiisi minibacana*, etc.

Suppose we were to give him tobacco, perhaps he would work. *Noa na la gea ma kuku minibasana noa onamaibaeaba* (last *ba* perhaps).

Also to express such a sense as "perhaps you had better," etc., *e.g.*:—

Toua (proper name), perhaps you had better go by this canoe, it will go quickly. *Toua eo, ga eva orou ma onibaeaba, veuveulasibaeade.*

Toua, it might perhaps be well if I was to give them tobacco. *Toua eo, omana la kuku minibiaa*na, *eboebosibaeaba i?*

but,

Toua, perhaps I had better give you tobacco, or It would be well if I were to give you tobacco. *Toua eo, gana la kuku minibauta*de, *eboebosibaea i.*

Besides the foregoing tenses, we have in the Mailu language an historical tense, not that it is one by itself, but compounded of the principal verb in the subjunctive and an auxiliary verb in the past tense. This is largely used in "reported speech" and in the telling of a tale or occurrence in which actors took part in speech, *e.g.*:—

The children had to come to him continually. *Ooeva nogo noa na la aisooisi-sei-neio.* (The hyphens are to clear my meaning.)

He was for killing his wife with a stick. *Ena avesa abara ma maisaisiseilosia. Mai* (verbal root), *saisi* (subjunctive), *sei* (auxiliary verb *seisei*, to do), *losia* (far past imperfect termination).

He said that they were to eat only coconuts. *Noa ma oseriata de nogo omoa ama kawowo ei bua isiloisooisiseineio.*

They went about to kill him. *Omoa ma oniai ele oniai usineio noa maisooisiseineiode.*

Adverbial particles as auxiliaries to verbs:—

mo, only.

ai, all.

goi, motion towards speaker.

Adverbial particles as auxiliaries to verbs (contd.) :—

goni, motion from speaker.

oni implies "it is needless to ask," or "that is just it."

In ancient times we just slept. *Boae uana gea mo-ui-ai-sineisa.* (The hyphens are merely for clearness here.)

The boys are all sitting down (implying that they are all together). *Tamaru auri-ai-loo.*

Bring him in to me (addressed to two men). *Noa ia ina varo la deni de odi danigoibiavai* (*deni de odiodi* is to lead, *danidani* to enter, *goi* towards, in direction of speaker).

They led him away (far past imperfect). *Omoa ma noa deni de odioniailoio* (*ai* collectively).

Take this rubbish away. *Denanu eva-goni-au* or *evasigoniau.*

They are (emphasis on the "are") working. *Omoa onamailoooni.*

When will they come (from mainland to the island where speaker is)? *Abo samu omoa gudusi-goi-soo i?* (*si* is euphony only. Always down (*gudu*) to an island from mainland (*goi*) towards speaker.)

Some more adverbial introductions into the verb :—

veuveula, quickly.

All of you come quickly. *Aea seriada aiveuveulasibiau.*

imoimogo, slowly (alternative form with *imaimago*. See *imago*, slow).

vagevage, a little (adverbially). See example.

nonoi, together or collectively.

karau, *karakarau*, secretly.

kawowo, *kawokawo*, nothing else but, aimlessly.

baubau, a long time, indefinitely.

asoaso, indefinitely, for ever, everlasting.

eroero and *ero*, back, backwards.

abuabu, *abu*, first, ahead. *Cp.* verb *abuabu*, to wait.

apu, full, all.

oi, over, across.

monono, tight (stick tight in mud or on reef).

lipu, tight (tie tight or stick tight with glue).

amari, again.

amama, well (used mostly with *suna*—as *sunaamama*, remember well).

aamu, fixedly, especially with "gaze."

ii, firmly.

kisa, strongly.

pai, tight, *e.g.*, wedged tight.

bo, first. When first I came, *Ina aiboiana.*

pakopako, loosely.

kiokio, crookedly, etc. etc.

Examples :—

Onivagevagelaesa or *onivagelaesa.* He is going on a bit.
Osinonoisibiau. Say it all together.
Usikarakarausususuesa. He is always acting secretly.
Maikarausiata. Killed them by stealth.
Ga osikawowolaesa. You are speaking for the sake of speaking.
Maikawokawosusuoo. They kill for the sake of killing always.
Auribaubauaa. I have been staying a long time.
Uru idaasoasoloisa. The house will stand for ever.
Bouaieroerosineigia. We were drifted hither and thither (far past).
Aieroveuveulasibiau. Come back quickly (addressed to more than two).
Ia oniabuabuisaa i? I will go first, shall I?
Ani isana ma aiabusia. The wind was ahead (literally, from in front).
Susuapusiba. Fill it up.
Maiapuisa i? Is it completely finished?
Odabueapusiba. Pour it all out.
Aiapusiau. Come all!
Noa idaoilaesa. He is stepping over (*e.g.*, into another canoe).
Aurimononosia. It stuck fast (*e.g.*, boat between two rocks).
Badilipusiana eidema. Because it was tied tight (could not be undone).
Usiamariba. Do it again.
Sunaamamasibiau. Remember well.
Noa didara eriaamulaesade i? What is he staring at?
Ausariiisibiau. Hold tight or firmly.
Gogakisamaibiau. Row hard.
Omoa idapailoio. They were standing wedged (far past).
Ga ausaripakopakosade. Because you were holding loosely, or *sana eidema.*
Dasarokiokiosiba. Don't write crookedly.

All adverbs are thus used introduced into the verb, their correct grammatical position in a sentence, and any adjective so introduced becomes at once by so being placed an adverb.

Impersonal verbs, i.e., verbs which do not take a personal subject but can take a personal objective suffix to show that the action expressed by the verb acts on the would-be subject.

In ordinary circumstances the impersonal verbs would be such as :—

It is raining. *Guba inilaesa.*
It is lightning. *Noa iviivilaesa,* or *iviivi idalaesa.*
It is thundering. *Goru idalaesa.*

But even the verb "rain" can govern a personal object, *e.g.* :—

I am in the rain. *Guba inilaesela.*
We shall have rain. *Guba inisagia.*
We must have rain (let it rain). *Guba inibagiaisi.*

Oh, may it rain! *Guba inibaiaisi!*
May it continue to rain. *Guba inilosibaiaisi.*

It is not only thus with such impersonal verbs as above, but with such verbs as "fall" or "slip." If with these verbs the subject is a person, then the verb takes an impersonal form, and governs the person in the dative case, *cp.* English "methinks," "meseems," where the "me" is indirect object (dative O.E.).

I shall fall. *Ia oiguduisela.*
Ga tatanaga i? Did you slip?
E, ia tatasela. Yes, I slipped. (The "*s*" in this *sela* is irregular, apparently for the near past, especially as the second person singular here has "*n*," which is generally the distinguishing mark of near past. *Cp., ainaa, ainasa.*)
Cp. omanaa, I stole yesterday (near past).
omasa, he stole („ „).
But, *aina,* he came.

Verbal nouns.—Verbal nouns are formed from the infinitive and the participle of the verb. In the case of the infinitive as a noun, the auxiliary verb *seisei,* either in its infinitive form or conjugated form, is used with the main verb in the infinitive. *Seisei,* to do, indicates no action of its own, but can be used with nouns, *e.g.*:—

Madava seisei means "gardening."
Isiisi seisei means "to eat" or "eating."
Isiisi seisei eboebo kawowo ei. To eat is indeed good.
Isiisi eboebo. The food is good.
Isiisi seilaesa. He is eating (he is in the act of eating).
Gana isiisi la oniba. Go to your food (or eating).
Evade isiisi seiba. Eat here (or do your eating here).

The verbal noun formed by the participle is made up of the verb in any tense or person with the suffix *na* attached. (In this way also all *verbal adjectives* are formed.)

Example of verbal noun from participle:—

Omana maiatana oreore notioo. Their being killed was very bad.
Gana sinisusuagana imago kawowo. Your growth is slow indeed.
Omana maiatana de gea inieisa. We cried at their being killed.

Auxiliary verbs—seisei, eiei, usiusi:—

What is he doing? He is (doing) eating. *Noa didara usilaesa i? Noa isiisi seilaesa.*

What are you doing? I am helping. *Ga didara usilaesa i? Ia laguai seilaa.*

Auxiliary verbs (*contd.*) :—

What is it? He is crying. *Didara i? Noa ini eilaesa.*

Usimini, to do, give, *i.e.*, to obey. *Usinowo*, to try.

Madi eiei, to sing; *lele seisei*, to play; *eboebo seisei*, to do good; *usieboebo*, to do good; *eboeboseineisa*, we always did good.

Verbs from adjectives.—All adjectives can take the verbal suffixes of the third person singular, and *govern indirect object.* Adjectives also become verbs by the use of the auxiliary verbs, *e.g.* :—

To be lazy. *Daroro seisei.*

To do good. *Usieboebo.* Do them good. *Usieboebosibiai.*

You (singular) are always good. *Ga eboebosusuaga.*

I was very good. *Ia eboebokawowosila.*

Here, as always, the third person singular has no distinctive indirect objectival suffix. It would appear that the third person singular was of little consequence, *e.g.* :—

He is sick. *Noa marailaesa.*

He is bad. *Noa oreorelaesa.*

I was good. *Ia eboebosila.*

You are wrong. *Ga edeedesaga.*

They two will be big. *Omadai ogodaisea.*

We two used to be bad. *Guadai oreoresineigua.*

You are a good man always. *Eboebosusuagana egi ga.*

Verb emphatic :—

-oni, added to personal suffix of verb.

-na ei, added to personal suffix of verb, *e.g.* :—

Don't you eat? I do eat. *Ga isiisi daseisusuesa i? Isiisi seisusuaaoni.*

This coconut won't grow, will it? It *will* grow. *Eva ama dasinisaba i? Sinisana ei.*

(The *-ba* after *sinisa* implies will it or will it not; alternative forms of this *-ba* are *-aba, -eaba, -eiaba.*)

Verb interrogative.—The future can be used to imply a question, but no other tenses :—

Taubada ia onisaa? Master, shall I go?

Noa aiesa? Is he coming? or, Will he come? (Is he coming here? in the sense of has he started to come—hence *aiesa*, will he come? *i.e.* indefinite, does he intend to come, *aisa?*)

But in all other tenses the interrogative is expressed by the use of *i* after the verb, *e.g.* :—

Isilaesa i? Is he eating?

Orebe manoo i? Have they caught fish?

To make it more definite still *de* is suffixed to the personal suffix and then the *i* is added:—

Don't they hear? *Dananiloode i?*
Perhaps they don't hear, is that it? *Dananiloo aba i?* or, *Dananilooba i?*

This interrogative can also be used with either nouns, pronouns, adjectives or adverbs, *e.g.*:—

Is it fish? *Orebe i?*
Is it I? *Ia no i?* (short form for *noa*, no.)
It is you, is it? *Ga no i?*
Is it he? *Noa no i?*
It is he (emphatic). *Noa noa ne ei.*
Is it finished? *Kokoasa i?* or *Kokoasana i?*
It is finished. *Kokoasa i*, or *Kokoa ei*, or *Kokoasana ei.* N.B.—*Kokoa*, no.
Is it there? *Neno i?*
Is it rotten? *Morusa i?*
Taubada i? Is it master?

The verb passive.—The passive voice in the Mailu verb is marked by no different personal suffixes from the verb active, but the particle *-na* is added to the suffix. And in the personal passive the indirect personal objectival suffix with *-na* is used, *e.g.*:—

The snake bit me (active). *Mio ma ia apusela.*
I was bitten by snake. *Ia apuselana mio ma.*
He hit you. *Noa ma ga keasaga.*
Were you hit? *Keasagana i?*
Mailu women make pots. *Mailu avesa ma omu watususuoo.*
The pots are made by Mailu women. *Omu watususuoona Mailu avesa ma.*
When he was hit, did he cry? *Noa keasiana noa inieilosia i?*

A neuter passive is found in the use of the third person singular and plural, with or without the *-na*, *e.g.*:—

Is it finished (say reference is made to a house in erection)? *Maiapusa i?*
Is it finished (say the water)? *Kokoasa i? Kokoasana i?*
Are the houses finished? *Uru maiapuio i?*
Yes, finished a long time ago. *E, boaede maiapuio.*

Verbs governing double dative, if necessary (but always dative):—

Seai, to seem, or appear, or think.
He will think me a liar (or I shall seem a liar to him). *Opaopa emegi omu na la noa ma ia seaisela.*
I thought he was you. *Noa gana la (ia ma) seailauta.*
I thought you were he. *Ga noa na la seaiaa.* (Here again, as always,

Verbs governing double dative, if necessary (but always dative) (contd.) :—

notice that the third person singular, objectival suffix, is missing and as usual the subjectival suffix is pronounced.)

We considered them good men. *Emegi eboebo la gea ma omoa seailosiata.*

They considered him a good man. *Emegi eboebo omu na la omoa ma seaisineio.*

You always think me a bad man. *Emegi oreore omu na la ga ma ia seaisusuesela.*

I thought it was rain. *Guba la seaiaa.*

You think it is fun. *Borere la ga seailaesa.*

Sunasuna, to want or to think.

They were wanting to sail. *Ariari la omoa sunaloio.*

We wanted to stop. *Auauri la sunaloisa.*

N.B.—I have come to see you. *Gana erieri la ainaa.*

This is a very different construction from the above. In the last example, "I have come to see you," "see" is a verbal noun, being infinitive, and is governed by the postposition *la*, denoting place towards which.

What have you come for? To look on. *Ga diadara aina i? Ao la* (*ao* from, *aoao* to look on).

What are you doing? Looking on. *Ga didara usilaesa i? Ao de.*

Particles with the verb :—

i, interrogation.

ei, emphatic, generally preceded by *na*, added to the verbal suffix. *Onisana ei.* He *will go.*

eidema, neaua ma, because, therefore.

de, added to the personal suffix or after it, indicates the reason for.

va, v, causative, also implies completion in the sense of already, *e.g.*, *vaina*, he has already come, *nina vagudusa*, the sun has already gone down.

oni, added to verbal suffix, emphatic.

ma, after verbal suffix implies that, in order that, out of (lit.), *cp.* Latin *ut*, *e.g.* :—*Noa ma omana la oseriatama, nogo oseriata.* He told them telling them (out of telling them he told them). *Oserigiama usiminisesaisiseineisa* (far past). He said we were always to obey. (Reported speech.)

na added to verbal suffix implies when, and thus becomes participial particle.

adaua, na, when, thus. *Noa adaua oseriatana onia.* When he had thus told them he went.

oma precedes the verb and implies soon, or certainly. *Oma aisa.* He will soon come. This in the sense of he will certainly come.

o? "Is it so?"

ba, aba, eaba, eiaba, perhaps, *e.g.*, *guba eaba*, perhaps it is rain.

Particles with the verb (contd.):—

-ba, -ba, either, or (or perhaps), *e.g., aisaba d'aisaba,* perhaps he will come, or perhaps he won't come.

Distinctive letters in tenses of verb—

-l- or *-la,* is the distinctive mark of the present incomplete or imperfect *e.g., ilisasa,* we are eating.

-lo- is the distinctive infix for the habitual future, the far past imperfect, also for the near past imperfect, which, by-the-way, is an imperfect complete, for the action is complete, *e.g.,* we have been eating, *gea isilonasa.* On to this *-lo-* are added the several tense formative distinctive marks, *e.g.,* future, *-lo-is-;* near past, *-lo-n-* (3rd, *-lo-s-*); far past, *-lo-i-* (2nd and 3rd, *-lo-s-*).

-n- is the distinctive mark of the near past or perfect.

N.B.—Verbs whose stems end in *u, o,* and *ni* dispense with this *-n-*, and merely suffix their personal endings on to the stem, *e.g.*:—

nadunadu, to nod, has *naduaa,* I have nodded.
onoono, to tempt, has *onoaa,* I have tempted.
danidani, to enter, has *danasa,* we have entered.

2nd and 3rd persons singular and 2nd and 3rd persons dual take *-s-*, hence the apparent anomaly:—

gudusa, he has descended.
guduseava, you two, or they two, have descended.

N.B.—Verbs whose stems end in *-si-* drop the *-si-* and make a strong perfect or near past by making the first letter the stem on to which the personal endings are suffixed, except again in the cases or the 2nd and 3rd singular and 2nd and 3rd dual, *e.g.*:—

isiisi, to eat, has *iasa,* we have eaten, but *isaea,* you or he has eaten.

usiusi, to do, has *uauka,* we two have done, but *useava,* you two have done.

Exception partly:—

osiosi, to speak, has *oiaa,* I have spoken. The *-s-* only being dropped, but *osaea,* he said, *oseava,* they two said, and *oioo,* they said.

Compare guduaa, I descended, and *gudugoinaa,* I came down (here), *i.e.,* where I now am as I speak.

-is- is the distinctive mark of the future, *e.g., gudu-is-aa.*

-isi is the distinctive termination in the formation of the subjunctive.

-b- is the distinctive formative letter of the imperative, from which again the conditional mood is formed by the addition of the pure personal suffixes: *-aa, -aea, -auka, -iava, -asa,* and *-oo.*

-susu- is the distinguishing infix in the formation of the past (and including present) habitual tense.

-ne- is the distinguishing infix which denotes the far past, but completed in far past habitual tense.

Notice.—The distant perfect distinctive letter is *-i-*, but the 2nd and 3rd singular and dual infixes *-s-*, *e.g.*, *guduia*, *-sia*, *-iuka*, *-siava*, *-isa*, *-io.*

In the case of verbs whose stems end in *-i*, as *onioni*, to go, the *-s-* is not infixed, and the only difference between 1st, 2nd, and 3rd persons in the distant perfect (and it is a marked and important difference) is that of accent, hence in writing out the verb I have put a hyphen in, and it is important to note this. Thus :—

on-i-a, accent on penultimate *-i-*, I went.
onia, here *ia* is more like a diphthong in sound.
oniuka, we two went.
oniava, you two or they two went.
onisa, we went.
oni-o, you or they went.
So also *oniloi-a*, etc., etc.
But *onilosia*, he was going.
onilosiava, they two or you two were going.

NEGATIVES.

kokoa, no.
kokoa tauna and *kokoa tautauna*, not at all.
da, *d'*, not (used with the verb which also it precedes).
teevai, no.

Da and *d'* are used with nouns, adjectives and adverbs, and are placed before them and are more correct than *kokoa*. The " no " and " not " in English is exactly the same in Mailu. *Teevai* can never be used with an adjective, noun or adverb, *e.g.*, *eboebo teevai* is quite incorrect and has no meaning.

POSTPOSITIONS.

la, to (motion towards).
na la, to (motion towards).
varo la, to (motion towards); *varo* contains the idea of " side," but it is never used by itself in that sense.
varo, to, with, or from.
de, at (rest at), on ; *gabi de*, on top.
na de, at (rest at).
varo de, at or with (rest at).
ma, from (motion from).
„ with.
„ mark of agent, instrument, purpose, distinguishes subject.

varo ma, from or with, *e.g.*:—

mari la, to the village.
uru ausu la, into the house.
ia na la, to me.
ina varo la, towards me.
uru deni aura de, outside the house.
uru ausu ma, from inside the house.
noa ma omana varo ma onisa, he will go with them.
noa na de ausario, they held on to him, or they held him.
omoa ma gena varo de auriloisoo, they will stop with us.
Mailu ma Delebai la, from Mailu to Delebai.
Arisa ma Goroa na la (boys' names) *minaea*, Arisa gave to Goroa.
Arisa ma Goroa ena varo la minaea, Arisa gave to Goroa.

CONJUNCTIONS.

nogo, and.

ele nogo, and, also but.

nogo ele, and.

eo, *o'*, and. Either of these is always employed in the use of repeated "ands," *e.g.*, axes and knives and wood and rope, *gilo eo, nogo bau o, nogo ana eo, nogo oraora eo.*

eidema, *dema*, *de*, because, joined to the verb. In the case of *eidema*, *na* is added to the personal suffix, and *eidema* follows, *e.g.*, *omoa onoona eidema*, because they went. *Maraisade* or *maraisana eidema*, because he is sick.

neaua ma, therefore.

de, if.

INTERJECTIONS.

kaie! of surprise.

kaiae!

kaiaemagae!

aee! reproach or sorrow.

o! a call.

adei! surprise (also used with possessive pronouns), *cp.* "mother!"

adeinabai, intense surprise......"mother and father!"

adeinadei, ,, ,, "mother of mothers!"

eo! a call, *e.g.*, *Paulo eo!*

eio, address, *e.g.*, *egi eio*......men!

ubai, surprise at cheek, or at one taking something that is not his. *Ubai gana goga rune?* Literally, What are you doing, taking what is not your own?

abai, surprise.

eisi, don't, no, you mustn't, etc., sorrow.
oe, a call.

NUMERALS.

1. *omu.*
2. *ava.*
3. *aiseri.*
4. *tourai.*
5 *ima.*
6. *ima lilia omu.*
7. *ima lilia ava.*
8. *ima lilia aiseri.*
9. *ima lilia tourai.*
10. *nanau omu.*
11. „ „ *omu.*
12. „ „ *ava.*
13. „ „ *aiseri.*
14. „ „ *tourai.*
15. „ „ *ima.*
16. „ „ *ima lilia omu.*
17. „ „ „ „ *ava.*
18. „ „ „ „ *aiseri.*
19. „ „ „ „ *tourai.*
20. *nanau ava.*
21. *nanau ava omu.*
29. *nanau ava ima lilia tourai.*

N.B.—To make it more definite that tens are meant, say, in sixty they use such helps as *bua*, or *kawowo*, or *duma* ; generally it is *kawowo*, these are placed, or rather one of them, if it is thought that the speaker will be misunderstood, after the *nanau*.

30. *nanau aiseri*, or *nanau kawowo aiseri*, etc.
40. *nanau tourai.*
50. *nanau ima.*
60. *nanau ima lilia omu*, or better, *nanau kawowo*, etc.
70. *nanau ima lilia ava*, or etc.
80. *nanau ima lilia aiseri*, or etc.
90. *nanau ima lilia tourai*, or etc.
100. *nanau gabana omu*, or *nanau kawowo bua nanau omu.*
200. *nanau gabana ava*, or etc.

After stating the hundreds, and wishing to show that there were still some tens left or again some units, the Mailu man will put in the word *woi*, which means

remainder or over, in such a phrase also as "Two each and one over," *avainama woi omu.* And the same occurs in repeating a large number to make it clearer:—

600. *nanau gabana ima lilia omu,* or etc.

2000. *nanau gabana nanau ava,* or *nanau kawowo bua nanau ava,*

and so on.

1st, *isana.*
2nd, *deni.*
3rd, *deni bau.*
4th, *ena deni bau.*

There is no particle which can be fixed to the numeral which can show position as 6th or 10th.

yesterday, *ilowo.*
day before yesterday, *arie.*
day before that, *arie bau.*
to-morrow, *itou.*
day after to-morrow, *wau.*
day after that, *wau bau.*
day after that, *wau guniguni.*
day after that, *wau unauna,* or *wau samusamu.*

Time is reckoned by days, months or moons, and years. The last being determined by the westerly seasons or by the coming into flower of certain trees. Since the introduction of Christianity time has also been reckoned by weeks or Sundays.

Distributives.

-anama, -inama, each. These are joined to the numeral as follows:—

Omuinama, one each.
Avainama, two each.
Aiserianama, three each.
Tourainama, four each.
Imainama, five each, etc.

Sentences.

Demonstratives:—

This man is strong, but that man is weak. *Eva egi kisasa, nogo ada egi berobero sa.*

This place is dry, but that place is wet. *Eva gabu wurawurasa nogo ada gabu nudasa.*

It is wet here, but it is dry there. *Eva de nudalaesa, adano wurawuralaesa.*

Interrogatives :—

Who told you to come ? *Ga auma oseragade aina i ?*
What is your name ? *Gan' omu aunoa ?*
Which man did you call ? *Abo egi ga kotusa i ?*
Whose pig have you stolen ? *Aunoa ena boraa ga omasa i ?*
When will you come ? *Ga abosamu aisa i ?*
When did you go ? *Ga abosamu onia i ?*
How shall I do it ? *Ia aboua (noa) usaa ?*

Possessive form of verb with "na" suffixed :—

He is eating the taro he planted. *Ena gadisiana tebele noa ma isilaesa.*
I am eating the tobacco you gave me. *Gana minilana kuku ia ma isilaa.*

Interrogative verb :—

Is he eating ? *Noa isiisi seilaesa i ?*
Will he eat ? *Noa isa i ?*
Did he eat ? *Noa isaea i ?*
Where are you going ? *Ga abo na la onilaesa i ?*
Where have you come from ? *Ga abo na ma aina i ?*

Negative :—

I have not eaten. *Ia da iaa.*
He will not be eating when you arrive. *Ga baedabaisana noa isiisi da seiesa.*

Adjective :—

The children are not good. *Ooeva daeboebosea.*
A good child. *Eboebosana oeva omu.*

Postpositions :—

He came from Delebai. *Noa Delebai* (place) *ma aia.*
He is going to Delebai. *Noa Delebai la onilaesa.*
He is at Delebai. *Noa Delebai de aurilaesa.*
He is going to Duba (a person). *Noa ma Duba ena varo la oniesa.*
He is coming from Duba. *Noa ma Duba ena varo ma aiesa.*
The man killed the woman with a tomahawk. *Egi ma avesa maia gilo ma.*
He hit the woman with a stick. *Noa ma avesa keasia abara ma.*

Adverbs :—

He came quickly. *Noa aiveuveulasia.*
He went to Delebai quickly. *Noa ma Delebai la oniveuveulasia.*
I shall go slowly. *Ia oniimoimogoisaa.*

Conjunctions:—

He came and I went. If this implies that when he came I went, then the translation is *Noa ainana onaa.* But if mere assertion to show how they two acted, then *Noa aia nogo ia onia.*

Duba and Mae are coming here. *Duba eo nogo Mae o eva na la aieseava.*

Dependent sentences:—

If you are hungry eat some rice. *Ga onuagade raisi utato isiba* (*de* conditional).

If you tell lies you will go to gaol. *Ga opaopaseisade nogo ga garu uru la onisa.*

If you had been good you would not have gone to gaol. *Ga eboebosibagade nogo ga garu uru la d'onibaea.*

Why did you go? *Ga didara onaea i?*

Why did you do it wrong? *Ga didama maileasa i?*

Why did you not do what I told you? Because I was tired. *Ga didara ina oserautana da usiminela i? Ia ubunu* (body) *beroberoselana eidema.*

He sat down because he was tired. *Noa aurigudusa beroberosade.*

I know that he has come. *Ena ainana ia v'elaa.*

I know that he is not there. *Ia vegarai ei noa nena de kokoae.*

I went to see the feast. *Ia onaa maduna ,eri la,* or *Ia onaama maduna elaa* (I went to see (and saw) the feast).

When you reach Delebai I will give you rice. *Ga Delebai la dabaisana raisi utato ia ma minisauta.*

When you are hungry I will give you food. *Ga onuisagana gana la isiisi minisauta.*

The man whom you saw yesterday has come. *Ilowo gana elaeana eg v'aina.*

Men who have carried the boxes will receive tobacco. *Lasi gabiona emegi kuku minisea.*

Mae gave Duba tobacco yesterday. *Mae ma Duba na la kuku ilowo minaea.*

Come quickly to-morrow. *Itou aiveuveulasiba.*

Interrogative:—

Are you eating? *Ga isiisi seilaesa i?*

Has he eaten? *Noa isaea i?* or *Noa va* (finished) *isaea i?*

Will you see him to-morrow? *Itou ga ma noa erisa i?*

Negative:—

He has not eaten. *Noa da isaea.*

I have not eaten. *Ia da iaa.*

He will not come to-morrow. *Itou noa d'aisa.*

He did not come yesterday. *Ilowo noa d'aina.*

To show objective person suffixes of singular number:—

He will give me tobacco and thee beads. *Noa ma ia na la kuku minisela nogo gana la bore minisaga.*

He will give thee tobacco and I will give thee beads. *Noa ma gana la kuku minisaga nogo ia ma gana la bore minisauta.*

I will give thee tobacco and he will give thee beads. *Ia ma gana la kuku minisauta nogo noa ma gana la bore minisaga.*

He will give him tobacco and I will give him beads. *Noa ma noa na la kuku minisa nogo ia ma noa na la bore minisaa.*

Short Vocabulary (not including hereinbefore given).

Sky, *nogara.*
Sun, *nina.*
Moon, *dovele.*
Star, *vitiu.*
Cloud, *nogara.*
Wind, *ani.*
Rain, *guba.*
Morning, *biga.*
Night, *garu.*
Land, *one, arima, wura* (as distinct from sea).
Sand, *one.*
Stone, *goibo, gomana.*
Hill, *oro.*
Lime, *lele.*
Water, *aama.*
River, *bomu.*
Sea, *lo.*
Salt, *sari.*
Fire, *eu.*
Ashes, *veve* (dead), *ginari* (alive).
Smoke, *bautu.*
Charcoal, *guruma.*
Man, *emegi, egi.*
Woman, *avesa.*
Female, *sina* (*boraa sina,* sow).
Male, *arabae* (*boraa arabae,* boar).
Chief, *vere.*
Child, *oeva.*
Father, *abai.*
Mother, *adei.*
Husband, *eme.*
Wife, *avesa.*
People, *emegi badabada.*
Ghost, *boi.*
Name, *omu.*
Shadow, *memeru.*
Body, *ubunu.*
Blood, *lala.*
Bone, *kisa.*
Flesh, *bilimu.*
Skin, *opi.*
Head, *uru;* skull, *moru.*
Hair (of head), *uru limu.*
Face, *isana, gogosa.*
Ear, *ope.*
Eye, *ini.*
Lip, *bibisa.*
Mouth, *noga.*
Spittle, *arimu* (a child's dribble, *noga geroro*).
Nose, *durumu.*
Tongue, *goba.*
Tooth, *maa.*
Arm, *ima.*
Elbow, *igusa.*
Finger, *ima duuri.*
Hand, *ima.*
Foot, *au.*
Thigh, *obe.*
Belly, *amara* (stomach, *beni*).
Chest, *sagasaga*

Milk, *di, susu* (introduced).
Nipple, *ama gogosa.*
Navel, *ini bo.*
Leg, *au.*
Foot, *au;* under foot, *au saga*; instep, *au papa.*
Toe, *au duuri.*
Pig, *boraa.*
Rat, *otama;* mouse, *oure;* also small house rat, *oure.*
Claw, *ima didi.*
Egg, *muruu.*
Feather, *papa.*
Cassowary, *guia.*
Fowl, *kamukamu* (introduced).
Cockatoo, white, *orama.*
„ black, *mae.*
Crocodile, *uaea.*
Hornbill, *bina.*
Snake, *mio.*
Fish, *orebe.*
Shark, *baea.*
Butterfly, *bebe.*
Fly, *nagama.*
Louse, *tuma.*
Mosquito, *nemo.*
Centipede, large, *doma;* small, *korado.*
Wallaby, *mani;* large species, like kangaroo, *aisi.*
Cuscus, *oura;* small, like opossum, with apparent web between fore and hind legs, and jumps from tree to tree, described as flying by the natives, *ledoledo.*
Forest, *larausu.*
Branch, *dana.*
Tree, *ana.*
Flower, *sioro.*
Leaf, *bega.*
Fruit, *lora,* or *tauna.*
Root, *tai.*
Bamboo, *kapakapa* (large); *bobomu* (small).

Coconut, *ama* (nut fully mature).
„ *gado* (green but ripe for drinking, with soft substance).
Coconut, *torata,* (green, but kernel mature).
Coconut, *aru* (contains water, but too young to possess substance).
Tobacco, *lugulugu* (native growth of).
„ *kuku* (imported tobacco).
Sago tree, *odei.*
Banana, *lavasa* (common name).
Betel nut, *ueni* (large).
„ *akai* (small).
„ *pasiva* (a very small nut of similar kind that is chewed).
Sweet potato, *kanua.*
Sago, *odei.*
Yam, *obili.*
Taro, *tebele.*
Sago palm, *odei.*
Village, *mari.*
House, *uru.*
Path, *laea.*
Mat, *eba.*
String, *aniani, maina* (introduced).
Rope, *oraora.*
Hook, *gau.*
Digging stick, *gebasa* (common name, *dora*).
Canoe (small, with outrigger), *waona.*
Outrigger float, *larima.*
Garden, *madava.*
Big sailing canoe, *orou.*
Sail, *laea.*
Paddle, *leva.*
Tomahawk, *gilo, dobudobu, dobuku.*
Adze, *sorisori, benene, sara* (canoe adze).
Pineapple club, *ilipa.*
Star club, *koilo.*
Disc „ *gore.*
Wooden club (not so much club as wooden sword), *leba.*
Club (common name), *gore.*

Stone adze, *ua*.

Arrow. Bows and arrows never used for fighting here. A child's arrow (*veroro*) used with a bow (*kaupisiri*) only applies to a toy arrow used by small children for catching fish.

Bow, *kaupisiri*.

Spear, *gara*.

Shield, *vesi*.

Tobacco pipe, *gigi*, *kapakapa*.

To-day, *evasamu*.

To-morrow, *itou*.

Yesterday, *ilowo*.

No, *kokoa*, *teevai*.

Yes, *e*.

I, *ia*.

Thou, *ga*.

He, she, it, *noa*.

We two, *guadai*.

You two, *aeadai*.

They two, *omadai*.

We, *gea*.

You, *aea*.

They, *omoa*.

My, *ina*.

Thy, *gana*.

His, her, hers, its, *ena*.

We two ours, *guna*.

You two your, *aeadai ana*.

They two their, *madai omana*.

Our, *geagena*, *gegena*, *gena*.

Your, yours, *ana*.

Their, theirs, *omana*.

There are no special pronouns or possessives, *e.g.*, in the case of food-stuffs.

Large, *ogoda*.

Small, *kiwonai*, *gigiri*, *kinawoi*.

Good, *eboebo*.

Bad, *oreore*.

Thick, *iduna*.

Thin, *selasela*.

Hard, *piaa*.

Soft, *bigabiga*.

Hot, *odaoda*, *viriviri*.

Cold, *nagura*, *memea*.

Old, *boae*, *baeau* (of persons), *taeau* (of things).

New, *gadara*.

Far off, *adabau*.

Near, *tebina*.

Clean, *neganega*.

White, *emeeme*.

Black, *dubaduba*.

Blue, *korakorara*.

Red, *lalalala*.

Yellow, *kedekede*.

Cry, *ini eiei*.

Eat, *isiisi*.

Drink (*aama*) *isiisi*.

Hear, *naninani*.

See, *erieri*, *ioio*, *ao*.

Sit, *auauri*, *auri*.

Stand, *idaida*, *idara*.

Sleep, *uiui*.

Spit, *arimuai*.

Bite, *apuapu*.

Taste, *aminowo*.

Pinch, *idoido*.

Come, *aiai*.

Bury, *odiodi*.

Buy, *woiwoi*.

Go, *onioni*.

Dig, *lavilavi*.

Bring, *evagoi*, *evasigoi*.

Give, *minimini*.

Take away, *evagoni*.

Plant, *gadigadi*.

Scratch, *gagogagoro*.

Speak, *osiosi*.

Know, *vegarai*.

Open, *utivara*.

Destroy. No common name for this verb. Each separate action of destruction only being phrased.

The nearest common word would be *usioreore*, to make bad.
Fear, *taguru, dobi.*
Stop, *aupaea.*
Alive, *mauri.*
Die, *baubau.*
Burn, *atiati, gabugabu.*
Fly, *levolevo.*
Drip, *supugudu.*
Burn (of food), *atikokomu.*
Now, *evaera, evaeva bua.*
Yes, *e.*
No, *kokoa, teevai.*
Presently, *looai.*
Quickly, *veuveula, ineinea.*
Thus, *evaua.*
Until, *ei la, ei la bua.*
Habitually, *uana seriada.*
Into, *ausu la.*
Out of, *ausu ma.*
From, *ma.*
Within, *ausu de.*
Without, *deni aura de.*
Above, *atana de.*
Below, *godana de.*
With, *ma, varo ma.*
By the side of, *varo de, aura de.*
Beyond, *ada aura.*
On this side, *eva aura de.*
In front of, *isana aura de.*
On account of, *neaua ma.*
Between, *gubare de.*
Under, *auna, godana.*
On, *de, gabi de.*
Behind, *deni aura de.*
And, *nogo, ele, ele nogo, eo...eo, o...o*
But, *nogo, ele.*
Also, *neaua bua, ele nogo.*
Lest, *...de.*
Because, *...de,...eidema,...dema.*
Like, *aua, eaua, evaua, neaua.*

ON THE MEANING OF KALOU AND THE ORIGIN OF FIJIAN TEMPLES.

BY A. M. HOCART.

To assert that most of the Europeans who lived in heathen Fiji quite misconceived its religious beliefs may seem presumption in such as have only come to know that country twenty-five years after its final Christianization. But we shall call in the word *kalou* as witness to the truth of this charge, and to the misrepresentations to which Fijian religion has been subject notwithstanding that Fison had suggested its true nature and that Dr. Codrington guessed the truth from very inadequate data.

Hazlewood defines the word thus: "A god, also a falling star which the natives took for a god . . . Kalou is used to denote anything superlative. whether good or bad."[1] Williams writes: "The native word expressive of divinity is kalou, which, while used to denote the people's highest notion of a god, is also constantly heard as a qualificative of anything great or marvellous. . . . Unless, as seems probable, the root-meaning of the term is that of wonder and astonishment, etc."[2] Mr. Basil Thomson repeats Hazlewood and Williams almost verbally, and seems quite satisfied with them.[3] And yet the meaning is so obvious that one feels almost ashamed to fill paper trying to prove it, nor did it escape Fison's good sense when he was "inclined to think all the spiritual beings of Fiji, including the gods, simply the Mota *tamate*."[4] The only correction we should make is to cut out the "inclined to think" and remove the objectionable "gods," which has caused all the trouble.

The confusion is the less excusable as the true meaning of *kalou* is recoverable even to the present day from the language of children in the Lau or Eastern group, where Christianity has now been supreme for some seventy years; only we must first be aware of the equation *tevoro* = *timoni* = *kalou*.

The second of these words is, of course, our "demon"; it is used chiefly in the Eastern Islands; but *tevoro* has now become naturalized in the language all over the group, and is apt to pass itself off both on whites and natives as of Fijian origin, much to the detriment of anthropology. It will be of some service to expose the impostor, who is none other but our own word devil as pronounced by the Tahitian

[1] *Fijian Dictionary*, s.v., *kalou*.
[2] *Fiji and the Fijians*, vol. i, p. 216.
[3] *The Fijians*, p. 111 f.
[4] Codrington, *The Melanesians*, p. 122.

teachers who first brought Christianity to Fiji.[1] Now since *tevoro* possesses meanings never held by its English original, it must have usurped the functions of some native term, and we should fix upon *kalou* as the dispossessed noun, even if all the men who remembered heathendom were extinct. But there are still enough living to save us from the uncertainty of inference; Seremaia of Kalambu[2] says *tevoro* came in with Christianity, the old word is *kalou*. Inia of Tamavua[3] holds the same opinion. Avetaia Kurundua, the ancient chief of Vuna on the Waimanu, is an authority full of weight, for not only has he fought on the heathen side against Mbau, but he has intelligence and a clear style not at all common among Fijians: he avers that *kalou* alone existed of old, and *tevoro* was unknown. I have been told by a white man that the people of Senggangga in Madhuata, the scene of the last heathen revolt, still exclaim "*kalou*" on seeing an apparition, and a Madhuata boy confirms this. Nor has the word completely surrendered yet to the intruder even in Lau; for a boy who was kicked down by another defiantly asked his antagonist "Are you a devouring *kalou* (*kalou kana*)"? which another explained as devouring *tevoro* (*tevoro kana*). Keni informs me that even in Vanua Mbalavu the old men still use *kalou* for *tevoro*; and this is noticeable also in Lakemba.

Having established our equation, let us look into the meaning of *tevoro*. Alipate Vola, a young but intelligent Lakemban, distinguishes three classes: (1) *tevoro* simply; (2) *vu*; (3) *luveniwai*. The *vu* are the so-called gods; they are also termed *tevoro vu*, and not uncommonly (invariably by the old men) *kalou vu*, though the latter is getting to be obsolete and does not seem to be always understood by the young. On the other hand, the author of an essay on the decline of native population,[4] rejects *tevoro* as implying evil works and reinstates them as *kalou vu*.

The *tevoro* proper are the souls of the dead (*yalo ni mate*) as everyone in Fiji knows or ought to know, and as the following instances will sufficiently prove:—

When the boys of the Provincial School of Lau were still new to the place, they stood in great dread of *tevoro*, because there were no less than three burial places in the grounds, and one quite close to the dormitories, too; nor were these fears unshared by the adults. Quite recently an old man, born in heathen days, brought a Tongan visitor to have a look at the school; on their return home they both fell ill: "That hill is an evil spot," he said to me, "it is inhabited (*tawa*); there are too many *tevoro* there, plenty of graves, everybody who goes there falls ill; the last steward was in a serious condition and when treated with *taitshi* medicine revealed that a 'thorny chief' (*turanga votovotoa*) buried there had smitten him." The Lord of Nayau once sent word to his nephew not to go down to the village alone at night as the chiefs lay buried on the hill and might do him a hurt.

One of the scholars being isolated in a small house came to see me with tears in his eyes, and asked leave to sleep in the dormitory, because a man had been

[1] The Tongan is *tevolo;* the Samoan, according to Williams' *Narrative of Missionary Enterprises*, *devolo*.

[2] Age about 50.

[3] Naitasiri tribe near Suva.

[4] See *Hibbert Journal*, October, 1912.

buried that day within the grounds, and he was therefore afraid of *tevoro.* A death down in the village was enough to frighten Poasa, who announced to a friend that he would beard the rules and sleep two in a bed rather than lie alone when a *tevoro* was abroad. Tarongi getting up at night saw a *tevoro* go from the assistant-master's house to the graveyard: he knew it to be a *tevoro* because his hair stood on end at the sight. Not long ago he thought he had seen a *tevoro* in the night and put it down to some human bones kept in the school. "I dare not cut firewood near the grave," said Ilaitsha, "lest the *tevoro* smite me."

Melaia Lutu, a learned old lady, once asked me: "Have you seen *tevoro* in Europe? the ghosts of the dead you know,"[1] and proceeded to relate how a half-caste, recently lost at sea, came in the night and sat on Loata's chest, that she cried out and awoke.

The *taitshi* is a common disease in Lau; the name is merely Tahiti pronounced in Lauan fashion, and is due to its introduction by the Tahitian teachers. It is caused by a *tevoro,* who deprives the patient of consciousness. In one of the two cases that came to my notice the patient had delirium and pains in the stomach. Those present declared a *tevoro* was devouring him (*e kania a tevoro*); when the leech[2] asked him the name of the *tevoro,* he said it was Koroiravotu, a man of Levuka in Lakemba, who died before the patient's time. The causes of *taitshi* are souls of the dead (*yalo ni mate*) and also *tevoro vu.*

I cannot omit here a very instructive case: one Sunday as I passed by a graveyard in company with an intelligent boy, a woman was weeping by a newly made grave; the boy was shocked: it looked heathenish,[3] it might do on a week day, but on a Sunday! . . . It would not be so bad if she had company with her, drinking kava. In vain I argued that sorrowing over the dead was legitimate; he retorted that she might mourn at home, and was not to be convinced but it was heathenish. The temptation to moralize upon this is too strong to be resisted; how dangerous it is for anyone to pull down native beliefs to make room for new ones, unless he thoroughly understands that with which he is doing away, lest the good be destroyed with the bad. The early missionaries, with their heads full of Kings and Chronicles and Greek mythology, saw nothing in Fijian religion but what they had been accustomed to expect; they mistook *kalou* for god, stripped the imagined deities of this supposed honourable title, and branded them as devils, unwitting that they were attaching infamy to departed souls, making mourning at tombs a heathenish and evil practice, and forbidding visible supports of pious remembrance to a people who think little of what they do not see and whom they already accused of a want of natural affection.

To return to our business, I have heard a wraith (*yalo mbula* = living spirit) spoken of as a *tevoro,* though contrasted with true *tevoro* (*tevoro ndina*). An

[1] ". . . *a tevoro mai Papalangi, a yalo ni mate ya.*" *Ya* has the force of you know, of course.

[2] I propose to use the word technically.

[3] *Vakatevoro:* the word used to translate our "heathen"; it means literally "possessing devils" or devil-like.

intelligent boy whom I consulted on the correctness of it was quite positive at first that a wraith is a *tevoro,* then added the qualification that it "was so reckoned in part only."[1]

I can cap this, however, for I have heard the word applied to the living: the tribe of Ndereivalu on the Udhiwai[2] used to hold a ceremony of removing the ashes from the fireplace, the *luku ndravu,* as it is called among them, *ta ndravu* among the coast people; they would make an offering of taro to "the old, weak, and white-haired men who are *tevoro,* are nearly dead."[3] A similar usage was found by Dr. Rivers and myself in Mandegusu, Solomon Islands[4]; a very old man was asked to be propitious (*mana*) to the fishing because he was "all same *tomate,*" *tomate* meaning the dead.

Williams founded his definition of *kalou* on its use to express admiration, but *tevoro* is now used in precisely the same way, an additional proof that it has taken the place of *kalou,* since *tevoro* was intended to defame the "gods" and not as a compliment. A native composer once excused himself from teaching my school boys music with the flattery that he was afraid of the "white *tevoro,*" who knew more than he did, and would pick holes in his performance. In the same way our Solomon Islanders would compare whites to *tomate* for cleverness.

To the three classes of *tevoro* there used to correspond three classes of *kalou*: (1) *kalou yalo* or ghost; (2) *kalou vu*; (3) *kalou rere.*

It was not so very long ago that the word ceased to designate ghosts in the interior of Viti Levu, as the following story will show: A child died in Serea in the morning; Medhawatu went off to plant, expecting it would be buried before he returned in the evening. While he was away the young men tied a string to his mosquito net. On his return he found the child unburied and the people wailing; vexed and grumbling he went into his house; as he squatted down to stir the fire he noticed that his mosquito net was moving: "A *kalou!*" he exclaimed, and taking an axe dealt it a great blow, ruining mats and net. He was much annoyed on discovering there was no *kalou* after all.

It is doubtful how far even now the word *tevoro* is reserved for whites, and *kalou* still reigns in their private talk.

According to Malani (in Genealogy, p. 444) if a ghost (*yalo ni mate*) appeared they would say: "So and so has come as a *kalou.*"[5]

"Apparitions were formerly called *kalou,*" says Seremaia of Kalambu; if a man was buried they called him their *kalou,* and *vanua kalou* (place of *kalou*) was synonymous for grave. In Sawani, the chief village of Vuna, the *kalou vu,* Tuleka,

[1] *E wili vaka tikina nga.*

[2] In the maps called Wainimala, but I have been assured that the Wainimala is from Undu upwards, in Nakorosule the proper name is Na Udhiwai; the people of Nandereivalu did not seem certain about their bit.

[3] *Na nggase malumalumu sikosikoa sa tevoro tu sa voleka ni mate.*

[4] Also called Eddystone; the Narovo of the charts and Simbo of the residents.

[5] "*Sa lako vakalou mai ko Ka.*" In his young days both *tevoro* and *kalou* were used for ghosts of the dead.

was only a slayer of souls and had no practical importance: they had recourse chiefly to *kalou yalo*, or souls of the dead, especially in war. When they saw a shooting star they would exclaim: "*O! a dhavu na kalou.*" (O! the *kalou* is rushing past.) Avetaia Kurundua thought these *kalou* were the souls of men or *kalou vu* that live in the bush, he could not quite tell which.

It was a universal custom to invoke the ghosts of fathers and remoter ancestors. The Lord of Tumbou in Lakemba[1] says: "Houses were sometimes built on graves as peace-offerings (*isoro*) on behalf of a sick child; for a father at his death became the *kalou* of his son. Feasts and many other sacrifices were made to the souls of men; in offering them up they mentioned the father's name in the prayer." Saimone Ngonedha, of Nakorosule, states: "If my father died he was my *kalou* and *kalou* of the whole clan also." When Seeman[2] visited Namosi a number of Seruans were slain and eaten: "One leg was said to have been deposited at the grove (? grave) of Viriulu, the deceased king and father of Kurunduandua."

This cult of the dead goes on at the present day in secret; examples of witchcraft are very hard to obtain, but I know of one which originally came from Kandavu. The details are irrelevant here, suffice it to mention that the present holder in burying the fatal leaves invokes his *kalou* to kill so and so; now this *kalou* is none other than Panipasa, the informant's great-grandfather, and it is the rule of this charm that a man calls upon his great-grandfather: "By him is the charm effective."[3]

I shall translate Saimone Ngonedha's account[4] how the soul of the dead is secured: "Now the son of the deceased nobleman (*turanga*) went to bring their ancient club or spear to stick it on the grave over the dead man's head. . . . As for that club which stood over the dead man's head on the grave, four nights after the death three or four sons (*luvena*) or brothers (*tadhina*) of the man painted themselves; they decked themselves out very bravely as if apparelled for war; they bore their weapons, then they went to the grave to pull out the club to carry it to the shrine (*mbure*); they might not meet on the way with any man till they reached the house (*mbure*) that was its shrine. The name of the club was the soul of the dead (*yalo ni mate*). It [the *yalo ni mate*] was found in the various families of the noble or common clans[5] in the several families in their several shrines (*mbure*). . . . The name of that shrine was the *mbure kalou*, it was ministered to (*nggaravi*) as the spirit of war (*kalou ni ivalu*) or spirit of sickness (*i.e.*, that heals sickness), or spirit of plantations or fishing, or animals, (*i.e.*, hunting). It was the complement (*ikuri*) of the ancestral spirit (*kalou vu*) or great spirit (*kalou levu*)." I have

[1] Really a Matuku man; he has seen heathen days.

[2] *Mission to Viti*, Macmillan & Co., 1862, p. 174.

[3] *Koi koya ka yanga kina na wai.*

[4] He was working in Taveuni for muskets when the annexation took place; he has an astounding memory, is an inexhaustible talker, and an unusually good narrator for a Fijian.

[5] Fijian clans (*matanggali*) are not, as a rule, exogamous at the present day.

found the same custom among the tribes of Nandereivalu, Emalu,[1] and Nambombudho; the informants mentioned no cult of the club, but all agreed in calling it "*yalo,*" and keeping it in the house; the Noiemalu carry the club to war. In Nanggelewai they also mentioned a custom of sticking a club on the grave with the words: "This is thy club; let us kill a man in war." This appears to be a distinct rite, for the club was left to rot. The ancient *kalou* have been cast out by Church and State, but into many a house thus swept clean they have returned in force and thinly disguised as *luveniwai sauturanga*, and such like, so that the last state is often worse than the first. It is interesting, therefore, to know that their votaries commonly bring clubs and staves to the medium (*vuninduvu*) to be anointed with kava and become the house or shrine (*mbure*) of their "friend," as the guardian spirit is called. I possess such a staff, the abode of "Lindinayaseyase," but the medium had one inhabited by no less than five hundred.

Along the lower Rewa there used to exist a class of ghosts known as *kalou turanga*, or noble *kalou*. In Tamavua they were ministered to by the "Noble Family" (*yavusa turanga*), a branch presumably bastard or cadet of the chiefly family. "These ghosts had no names, so numerous were they; they are the chiefs that are *kalou*. . . . They say they are the ghosts of the chiefs that die and go to stay in Nadhau. . . . In the prayer to the *kalou turanga* they enumerated all the graves of chiefs." The Ravu Sambe were dangerous ghosts (*kalou*) that smote men: "They are the ghosts of irascible chiefs; . . . it was their character formerly (*i.e.*, in their lifetime), chiefs that used to kill men for eating a big fish or stealing a woman."

Avetaia Kurundua's grandfather was a "*kalou*"; his ghost used to enter a jar (*sangga*) on the *kaurua*,[2] and announce his coming by a rattling (*tanggiringgiri*) inside. The souls of common people (*tamata kaisi*) were also ministered to (*nggaravi*) but they had their several little shrines; there were the souls of the headmen of the clan (*turanga ni matanggali*): if a man died he became a *kalou*.[3] The souls of chiefs (*yalo ni turanga*) entered the parrot (*kula*). The tribe of Lomaivuna, which centres round Viria, was once part of the same tribe as Vuna; they also have a *kalou vu* called Tainaki, and *kalou turanga*, which are the souls of chiefs, both have the hawk as the vessel (*wangga*) into which they enter.

A little further up the Rewa in Natavea they only made offerings (*soro*) to the souls of the dead, and made them in the *kalou* shrine (*mbure kalou*); these souls of the dead were described as "owning *kalou*" (*kalou itaukei*),[4] the chiefs that died of

[1] Always called Noiemalu (Mr. Ad. Joske wrongly spells Nuyamalu); but *noi*, as Fison pointed out, means dwellers in, and therefore, to be consistent, we must either speak of the Kai Nandereivalu and the Noiemalu, or else of the men of Nandereivalu and Emalu.

[2] The two parallel tie beams at the end of a house.

[3] *Kevaka sa mate, sa kalou nga: sa* has a positive force, as my authority on grammar puts it, "there is no disputing it (*veimba*), it is heavy (*mbimbi*), whereas *e* would be light (*mamanda*)." *Ga* indicates, according to the same authority, that he is *kalou* from his death onward, without *nga* it would mean merely that he is *kalou* at the time of his death.

[4] *Itaukei*, owner, is the title of chiefs about these parts.

old to whom offerings were made; they made no offerings to the souls of common people.[1] One informant went so far as to say: "If a man worships a stone, a ghost of the dead is there; they had no other *kalou*. Our bird was the parrot (*kula*), that ghost (*kalou yalo*) entered the parrot to go with them to battle. . . . The souls of common men did not enter animals." A second visit to the same tribe failed to obtain a repetition of this most important statement, no wonder since in Fiji it is only one in a thousand that can think clearly, and the right man was not there; but the existence of *kalou yalo* was confirmed, though the rather dull teacher could not offer any explanation of the term; he thought, however, that Roko Semba, their "god," must have been a man.[2]

We should expect that going still further inland these souls of the dead would overspread the whole religious system allowing the *kalou vu* merely to peep through; but strangely enough from the junction of the Udhiwai and the Wainimbuka upwards these latter are master again, with this difference, however, that they stand at the head of the pedigrees, and do not go further back than eight or nine generations, whereas no east coast pedigree (excepting Moala) ever seems to get back to the *kalou vu*; moreover, private deities certainly flourished under the shadow of the *vu*, whereas, on the coast, they seem to have declined, just as the common people have gone down with the rise of the chiefs.

The *kalou vu* are sharply distinguished from *kalou yalo* in most places; it is doubtful how far this is due to the influence of missionary teaching; it is hard to find an old man who can expound the days of his youth, and the middle-aged men, our main hope, though accurate in facts, have been influenced theoretically by the doctrine that the "gods" are fallen angels anterior to the creation, and if the new heathendom denies that they are devils, it has taken up with enthusiasm the theory that they are primæval.[3] Even men who have known heathendom give a cautious adhesion to the new doctrine, while taking care not to accept the responsibility for it or for the ancient beliefs; thus Inia, forsaking the truth, thinks the old men erroneously took the *kalou turanga* for departed spirits, possibly they were *kalou vu;* Avetaia Kurundua says they have now been taught that the *kalou vu* existed from the beginning, and are really fallen angels. It is certain, however, that the distinction must have emerged in pre-Christian times; the only question is how far it was so in the various districts. The ultimate identity of *kalou vu* and *kalou yalo* can hardly have been unknown to the men of Vuna and Viria; and it is uncertain how far Avetaia does not perceive it even now.

Inia knows of the identification of *kalou vu* with departed spirits, for he says "But *kalou vu* also we falsely represent as souls" (*Ia na kalou vu tale nga enda*

[1] Fijian is entirely relative; the context refers to public ceremonies, and this statement probably refers only to public rites.

[2] The prayer given in *Hazlewood's Grammar*, p. 63, calls upon the *kalou mata ni vanua:* by analogy these must be the souls of heralds; note also that Roko Tui Viwa (Noble Lord of Viwa) is also mentioned.

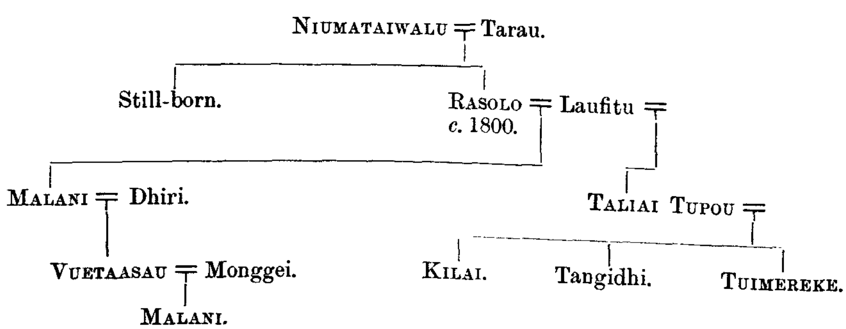
[3] This does not seem due merely to the fact that they have been Christian longer and therefore remember less about secondary cults.

lasutaka me yalo). In spite of the *enda* (we inclusive) it must be an old theory, since Inia does not believe it himself.

As a rule the inland tribes have an ancestor who was a *kalou*, but whose children were men; at least, this is the present doctrine. These *kalou* do not enter animals, and bear no trace of an animal origin, though always connected with one, and are transparently human chiefs. Among the Waimaro tribe the ancestor is Nggamau and his sons are the ancestors of the various clans, with their various temples; they were invoked publicly (*e tumba*), whereas the inferior *kalou*, to wit, the ghosts of fathers and grandfathers, were ministered to in private (*e vale*). The grandsons of Nggamau were men. So also the Nambombudho tribe have a *kalou* to ancestor, whose son was born a man (*sudhu vakatamata*).

The expression *kalou vu* is in itself conclusive enough, for *vu* is the base or trunk of a tree, metaphorically the root, the origin; in Naitasiri and Vuna it is used of the great-grandfather.[1] The Lauan *tupua* is obviously Tongan,[2] and the etymology so obvious that a boy of sixteen could derive it from *tubu*, to grow (Fijian *tumbu*), and explain it as "the stock of generations" (*a itumbutumbu ni kawa*). The Fijian *tumbu* is in many parts of Fiji the term for the paternal grandfather.

Abortions or miscarriages[3] in noble families are a common species of "great *kalou*" (*kalou levu*); though they may be distinguished from the *kalou vu* (and naturally, since they are not ancestors), yet their position and cult are identical. The present dynasty in Lakemba is called the Vuanirewa; it is an offshoot of the Katumbalevu clan, and has, therefore, the same *kalou vu*, Tokairambe,[4] but it has added thereto the still-born child (*lutu ndra*) of Niumataiwalu, the founder of the dynasty, and his wife Tarau. I give an extract of genealogy to show the eldest living generations:—



[1] Cp. *lu giz* in *Torres Straits Cambridge Expedition*, vol. vi, p. 93.

[2] *Tala tupua* in Tongan is a tale of ancient days; it is also used in Lau.

[3] Williams, *op. cit.*, p. 216: "Monsters and abortions are often ranked here."

[4] Wrongly represented by Williams as a deity acknowledged all over Fiji. He it was, and not Tui Lakemba, who entered the hawk, *Fiji and the Fijians*, p. 216; Frazer, *Totemism and Exogamy*, vol. ii, p. 135; Tui Lakemba has no animal. This is but one, and not the most serious of Williams' inaccuracies.

Malani, the son of Rasolo, also received a cult; he it is to whom Calvert refers as "a late brother of the King (Taliai Tupou) who was now deified."[1]

The tribe of Namata's great *kalou* was "He of Ndelainumbu" (*Ko mai* Ndelainumbu); but an abortion called "He of Nanduruvesi" was later adopted by the sub-tribe of Namata as their *kalou,* "He of Ndelainumbu" being thenceforth restricted to the Naimbili sub-tribe only.

Ratumaimbulu of Mbau and Ovea is a snake, and might be adduced to prove that the *kalou* is a totem; but the name is too transparent: it means "The Lord in the Tomb," or "in ghost land." The East coast people, it is true, will often tell you that their *tevoro* is a hawk, or a shark, or some other animal, but it will not be long before they will let you know that this animal is the "body" (*tolo*) or "vessel" (*wangga*) of a ghost; the highland tribes, on the other hand, do not appear to believe in metempsychosis, and I never remember them to have spoken of their totem simply as *tevoro* or *kalou,* though they might call him *manumanu vu* (ancestor animal). I believe I have also heard *manumanu tevoro* (*tevoro* animal); but the proper name is *idhavu ni yadha* in the east, and *vutiyadha* in the west: both mean "the utterance of the name."

Kalou vu are generally not known by their real names, very often they are called *vasu* to such and such a place; it is hard to see how they could be *vasu* unless they had once been men. Among the Kai Vuna, when the ghost of the dead entered the jar, the people said: "Ah, that is the ghost of the *vasu* to Naitasiri, or *vasu* to Lomaivuna." The latter was the title of Avetaia's grandfather.

Crossing the dividing range between the Rewa and Singatoka rivers, we find ourselves in the midst of another language and more rudimentary customs. The word there for *kalou* is *nitu,*[2] and as it has not been promoted to the status of god, there is no vacancy for *tevoro* to fill; the word is, therefore, still current in the dialect (except in Vatulele), though the word *tevoro* is substituted in speaking to whites. Now Seremaia[3] of Neilanga[4] defines it thus: a ghost (*yalo*) that walks in the dark and howls, my father or . . . "[5] He supposes that in Mbau, *tevoro* has been applied to Satan: "Mbau misappropriated (*kauta tani*) the word *kalou* to mean God"; he asserts that Tonitonisau, the great *nitu* of the Tio clan, is their first chief, from whom the present chiefs are descended, and adds: "of old we worshipped ghosts of the dead only; we now know the true God."

The tribe of Mbukuya, the original inhabitants of the left bank of Mba River, dread even now a *nitu* called "*vasu ki Mbukuya.*" Its birth was on this wise: a woman of Mbukuya was married to a man of Mba, but she committed adultery with a man of the clan of Oso in the tribe of Tambanivono, and by him became pregnant; it proved a miscarriage. Once a man of Teindamu was inspired and

[1] Second part of *Fiji and the Fijians, Mission History,* p. 112.

[2] When not immediately preceded by the article *yanity.*

[3] He has killed his man and puts down his bad teeth to cannibalism.

[4] *Nailanga* is the official spelling but that is Eastern Fijian.

[5] *Yalo ka ndau lako e na mbutombuto ka kaila, na tamanggu se* . . .

said: "I am your *vasu*; my mother is so and so; I go to dwell in Mba; if there is a war I shall come and foreshow it to you."

Viseisei on the coast south of Lautoka also worships an abortion.

There is besides a countless host of beings who are said to be neither ghosts of the dead nor ancestors; they are known as *kalou rere* in the east; the west calls them *uluvatu* (stone heads), and groups them together with Tuwawa, Ndrim', Mandingi, and others, as distinct from the *nitu* proper. But the cult is not materially different from that of ordinary ghosts; among the people of Waimaro it is mixed up with the ordinary cult, for the song or incantation of the *rere* mentions *kalou vu* that appear in the genealogies, and we might remain ignorant of its connection with the *rere* but for the refrain :—

rere vondo mai.
rere embark.

In the Highlands and the west they are spirits of war, and that is precisely the chief function of the *kalou yalo* of Vuna, Lomaivuna, and Natavea. *Luveniwai* is the modern name; there are several varieties; the one called Sauturanga is dedicated to Nadhirikaumoli and Nakausambari, who shot Ndengei's pigeon[1]; Ndakuwangga, the great shark of Taveuni, receives the devotions of others. It is, therefore, a reasonable hypothesis that the *kalou rere* was a cult of the dead, somewhere in the Highlands, which so struck the imagination that it spread all over, and of course no tribe but the inventor would know who the spirits really were. On passing down to the coast it became mere play. I must, however, mention a theory which I have heard from no one besides Saimone Ngonedha: it is that each man has a *luveniwai*, which is the spirit of the blood of his mother, and is merely brought into closer relation with his human brother by the mysteries. This is probably a new and individual theory, but it is interesting as showing that some men still find the need of assigning a body to unattached spirits.

The application of *kalou* to men and wonderful objects is quite simple, and does not require Williams' hypothesis at all; the ghosts of the dead are *mana* and work miracles; anything, therefore, that seems miraculous is *kalou*, not always metaphorically; there is no doubt that when muskets were dubbed "*kalou* bows" (*ndakai kalou*) the natives really thought they were made by spirits or were spirits themselves. A former native officer in the police told me that in the government's little war against the Highlanders, the breech-loading guns were first given out to the police; the enemy seeing their deadly effects cried out: "*yanitu, yanitu.*" The white man was probably first taken for a ghost from ghost land,[2] and later, when his humanity was proved, his wonders seemed wrought by spiritual agency. At the present day natives are firmly convinced that the circus (in which all conjuring and

[1] *Cp.* Basil Thomson, *The Fijians*, pp. 138 *et seq.*

[2] According to Saimone Ngonedha the Highlanders used to know Taveuni and Lau only as ghost lands (*vanua ni yalo*).

illusions are included) is a kind of *luveniwai*, and cannot understand why the cult is tabooed to them and allowed to the whites. A boy once inclined to think photography might perhaps go by spiritual agency (*vakatevoro*). Dr. Codrington[1] is unnecessarily subtle, besides being grammatically wrong, in trying to explain how Tui Kilakila could say: "I am a god." The Fijian would be *koyau na kalou*, which, notwithstanding the absence of all verb, is definite present, and cannot refer to some future time. Tui Kilakila called himself a *kalou*, because, like all chiefs, he had *mana*, and was in so far a *kalou*; for it is an accepted doctrine in Fiji that the words of a chief have *mana* (*e mana na vosa ni turanga*)[2]; I hope to show in some future discussion how this *mana* may have become attached to them.

If any doubt survives as to the meaning of *kalou*, a study of temples and graves should finish it. The resemblance between a modern Fijian grave and the foundation of a house is hard to overlook. In Lau they both consist of long mounds, prevented from crumbling away by a border of rounded stones piled up or of slabs planted in the ground; chiefs' graves, like chiefs' houses, are higher. In the Highlands stumps of tree-fern are often used in both house and grave. What is the use of hypothesis, however, when facts are at hand? Rudimentary sheds of corrugated iron without walls are still set up, "out of love to the dead," over their resting-place. In Lau and Kandavu it was the custom in heathen times to erect a small "movable house" (*vale siki*), consisting of a roof erected on a rectangle of four beams, so that the whole could be lifted up in order to weed the mound, and weeding was sometimes an act of propitiation. Erskine writes[3]: "Mr. Knapp saw in the village (Levuka, Ovalau) the grave of a child . . . which he described as a diminutive house about 2 feet long, and of corresponding height, with doors and windows complete, formed of coloured native cloth, and resting on a foundation of white native cloth." In Williams' *Fiji and the Fijians* we find: "Over some of the graves a small roof is built, 3 or 6 feet high, the gables of which are filled in with sinnet, wrought into different-sized squares, arranged diagonally."[4] Also: "In certain parts of Viti Levu the same reason is assigned for burying their dead in the temples." A Lakemban nobleman, Roko Kilai, was buried on the top of the foundations of Tui Lakemba's temple. Mrs. Gordon Cummings[5] in Somosomo "came to an old graveyard, and noticed that the fence round it also enclosed a large native house. Here it was that the father of the present Tui Thakau was murdered and his wife strangled at the funeral. They were buried in the house, which was then abandoned and rendered *tambu* to all Fijians." How much better had it been if Williams had given concrete instances instead of general statements when he says: "The spot on which a chief has been killed is sometimes selected as the site of a *mbure*," what we should like to know is, who was the *kalou* worshipped in that *mbure*.

It is not proposed to derive the temple from the grave, but both from a

[1] *Melanesians*, p. 122.
[2] *Cf. Man*, X, 56.
[3] *The Islands of the Western Pacific*, 1853, p. 216.
[4] pp. 191, 193.
[5] *At Home in Fiji*, vol. ii, p. 44.

common original, to wit, the dwelling-house, or more especially the "hall" (*mbure*). A good instance is to be found in Calvert's history of the mission: "He found her (Tangidhi) removed to the house of a late brother (Malani) of the King, who was now deified and said to be specially present in his old house."[1] The men of Mbukuya regularly buried people in houses. The tribe of Yalatini, to the east of Mba, also buried in houses; if they selected for the purpose the foundations of an abandoned house they built up the whole again to "cover over so and so that the rain and sun might not reach him," and the new house was used as a dwelling. This seems decisive enough, and we can confidently affirm that in Eastern Fiji graves are degenerate houses of common people, and temples the exalted halls of chiefs. Modern houses in certain parts of the Highlands strongly suggest by their very high roofs the pictures of old Fijian temples, and it is therefore possible that the *mbure kalou* has retained the original architecture of the ancient home of the people.

We can now understand why the *mbure* (temple) "though built expressly for the purposes of religion . . . was less devoted to them than any others." The truth is that it was not built expressly "for the purposes of religion," and that Williams was merely giving his inference as fact, and a most paradoxical inference, too.[2]

Burial in houses was not practised in Naitasiri, as far as my information goes, and temples must therefore have been introduced. But offerings do not necessarily require a temple; thus, the clan of Nawavatu in Kalambu, Naitasiri, used to visit with presents the stone of Tui Nanggumu in Nanggumu; there was also a temple called after that place, which corroborates our inference. The Naitasiri graves were regularly cleaned; in Lau it was the custom before a *tingga* match to clear certain places in the bush known as *vanua tevoro* (now; formerly of course, as *vanua kalou*) in order to obtain success in that game.

Kalou, in short, means nothing more or less than "the dead"; it stands for a concept which runs unchanged through the whole of Melanesia, though many and various are the verbal forms it assumes: *tomate* in Roviana, *nggohele* in Nduke (Kulambangara), *zhiolo* in Vella Lavella, *tindalo* in Florida,[3] *aremha* in Tanna,[4] and countless others. The multitude of words for one idea requires some technical term: I suggest *manes*.

The thesis maintained in this paper may seem over obvious; only lately Mr. Basil Thomson has treated Fijian religion as ancestor worship[5]; but, with

[1] *Loc. cit.* [2] *Op. cit.*, p. 222.

[3] Codrington, *op. cit.*, p. 124.

[4] Turner, *Nineteen Years in Polynesia*, p. 88.

[5] *The Fijians*, p. 112, I cannot refrain from expressing my astonishment at finding a repetition of Williams' impossible statement that "Ndengei is the joint symbol of creation and eternity" (*cp. Fiji and the Fijians*, p. 217); it would be impossible to translate this into Fijian so as to be intelligible to a native, to say nothing of its being conceived by them; a people who have a word for a point of time (*gauna*), but none for period or time in the abstract and have been obliged to adopt our word (*taime*), are not likely to rise to such lofty symbolism, which is somewhat beyond me. Williams' statement that the *kalou vu* "are supposed to be absolutely

the exceptions mentioned at the outset, none seem to have got hold of the plain direct truth. Fijian religion has been laid hold of at the wrong end, and it has required " cycle on epicycle, orb in orb " to fit the supposed meaning of *kalou* to the facts: deification, *kalou vu* imported from Polynesia, prostitution of sacred buildings to secular purposes, delight in the worship of monsters and so forth. But no better excuse could be pleaded than that distinguished anthropologists have been misled by present confused usage; the facts above adduced make it hard to maintain with Frazer that *tevoro* are deities " which, though no longer conceived as animals, can yet assume at pleasure the shapes of those animals with which they were formerly identical."[1] I have never yet come across a coastal Fijian who identified the deity with the animal or spoke of it as turning into an animal; the expression is always that the *kalou* is " embodied " (*vakatolo*) or " envesseled " (*vakawangga*) in it or enters it (*dhuruma*)[2]; both these terms are applied also to the " priest " who is possessed by a spirit; in fact, when I have asked " what is the 'body' or 'vessel' of so and so "? I have generally been told the name of the priest. As for the Highlands, that is another question; it seems extremely doubtful whether Dr. Frazer's description will fit them: I do not see how it is possible; but the whole question of their totemism is very involved and calls for further investigation.

Nor will this paper be entirely wasted if it can convey a hint, which I have so far missed in literature on Fiji, of the diversity which exists, not merely in individual names, but even in the very type of religious beliefs prevailing in various regions.

eternal," is equally valueless; not only is the idea un-Fijian, but we could quote many a famous *vu* who was born: Ndaunisai, Tokairambe, Nggamau, Kumbua vanua, etc. Evidently Avetaia did not learn this doctrine of immortality from his fathers.

[1] *Totemism and Exogamy*, vol. ii, p. 140.

[2] Somewhere along the Rewa (I cannot find the passage in my notes), I was told that sharks did not bite unless a *tevoro* entered them.

NOTES ON THE PHYSICAL ANTHROPOLOGY OF CHINESE TURKESTAN AND THE PAMIRS.

[WITH PLATES XXXI–XXXV.]

BY T. A. JOYCE, M.A.

IN the *Journal of the Royal Anthropological Institute,* Vol. xxxiii, 1903, p. 305, I was permitted by the kindness of Dr. M. A. (now Sir Aurel) Stein to publish the physical measurements which he had made in the villages of Khotan and Keriya during his first archæological expedition in the Taklamakan desert in 1900–1901. During his more recent expedition, in 1906–1908, he secured a far more extensive series, which includes most of the towns and villages around the desert, and also certain tribes of the mountainous country to the west and south-west. The preliminary account of this second journey has already appeared (*Ruins of Desert Cathay,* reviewed in *Man,* 1912, 89), and the extent and value of the archæological discoveries made by him are admirably foreshadowed therein. When we consider the archæological and geographical results alone, we cannot but be amazed at the energy and pertinacity of the man who accomplished so much in comparatively so short a time. But even these results do not represent the sum total of Sir Aurel's activities. In the midst of all his other work he found time to collect the measurements of over 600 individuals (ten separate measurements being taken on each subject) and to record their "descriptive characters" as well. The deductions from these measurements he has kindly permitted me to examine and to publish with the accompanying notes; the complete list of individual measurements will, it is hoped, be published in his final official report of the expedition, which will bear the title of *Serindia.*

METHOD.

The following measurements were taken on practically all individuals, in accordance with the instructions published in the third edition of *Notes and Queries on Anthropology:*—(1) head-length; (2) head-breadth; (3) nose-length; (4) nose-breadth; (9) bizygomatic breadth; (9a) total facial length; (16) standing height; and (20) span of arms. In addition, two other measurements were noted (UFL) upper facial length, from nasion to alveolar point, and H, horizontal circumference of head, passing over glabella and occipital point. Besides these measurements, the following descriptive characters were recorded, also in accordance with *Notes and Queries:*—Colour of skin and eyes, presence or absence of the "Mongolian fold," colour, character, and amount of hair, shape of face, shape of nose, and profession of the subject. From the measurements taken,

the following indices have been calculated:—Cephalic, Nasal, Total Facial, Upper Facial, Stature-Span. In the facial indices the total facial length and upper facial length respectively are expressed as percentages of the bizygomatic breadth, according to a method frequently adopted, which, however, is not that given in *Notes and Queries*, where the converse is recommended. The stature-span index is obtained by reducing the span to a percentage of the stature. The absolutes and indices have been grouped according to tribe and village, and for each group the Means, Standard Deviations, Coefficients of Variability and their probable errors have been calculated. In the subjoined paper these will be symbolized as follows:—M = mean; EM = probable error of M; σ = standard deviation; $E\sigma$ = probable error of σ; C = coefficient of variability; EC = probable error of C.[1] The various means, together with their probable errors and variabilities, are shown in Tables 1 to 7.

In dealing with so large a number of means of absolutes and indices (fifteen in all) it is very difficult to estimate the extent to which one tribe may be related to another, especially as more than two elements appear to enter into the composition of the population as a whole. An attempt has therefore been made to assess the difference between each pair of tribes in the following manner. A pair of tribes is taken, and from the means and standard deviations of corresponding absolutes or indices (symbolized as M_1 and σ_1, and M_2 and σ_2, respectively) is obtained the fraction $\frac{M_1 - M_2}{\sqrt{\sigma_1^2 + \sigma_2^2}}$. This fraction we will call Δ, and when Δ has been found for each absolute and index for every pair of tribes, the various Δ's expressing the difference between each pair are added together. The total, which we will symbolize as $\Sigma\Delta$, may be termed the "Differential Index," and expresses in a single term the sum of the differences existing between each pair of tribes. The $\Sigma\Delta$ for all pairs of tribes are shown in Table 8, and it may be added that where a $\Sigma\Delta$ contains among its factors a Δ which amounts to 1 or over, that $\Sigma\Delta$ is printed in italics.

In this connection I must acknowledge the valuable assistance of Mr. H. E. Soper, of the Biometric Laboratory, University College, London. He is responsible for the calculations which have given M, σ, and C, and their errors, for all absolutes and indices except those relating to head-length, head-breadth, and the cephalic index; and has calculated all indices except the cephalic. Further, he has prepared the Tables 6 and 7, and it was he who suggested to me the formula for

[1] S being the sum of each group of absolutes or indices, N the number of individuals composing the group, D the difference of each individual from the mean, SD the sum of these differences, and SD^2 the sum of the squares of the differences; then $M = \frac{S}{N}$, $\sigma = \sqrt{\frac{SD^2}{N}}$ $EM = \frac{\cdot 6745 \times \sigma}{\sqrt{N}}$, $E\sigma = \frac{\cdot 6745 \times \sigma}{\sqrt{2N}}$, $C = \frac{\sigma \times 100}{M}$, $EC = \frac{\cdot 6745 \times C}{\sqrt{2N}}$. With regard to EC, however, it should be added that in all cases except the cephalic measurements and index, the fraction given above has been multiplied by $\sqrt{1 + 2 \times \left(\frac{C}{100}\right)^2}$. The difference produced is inessential.

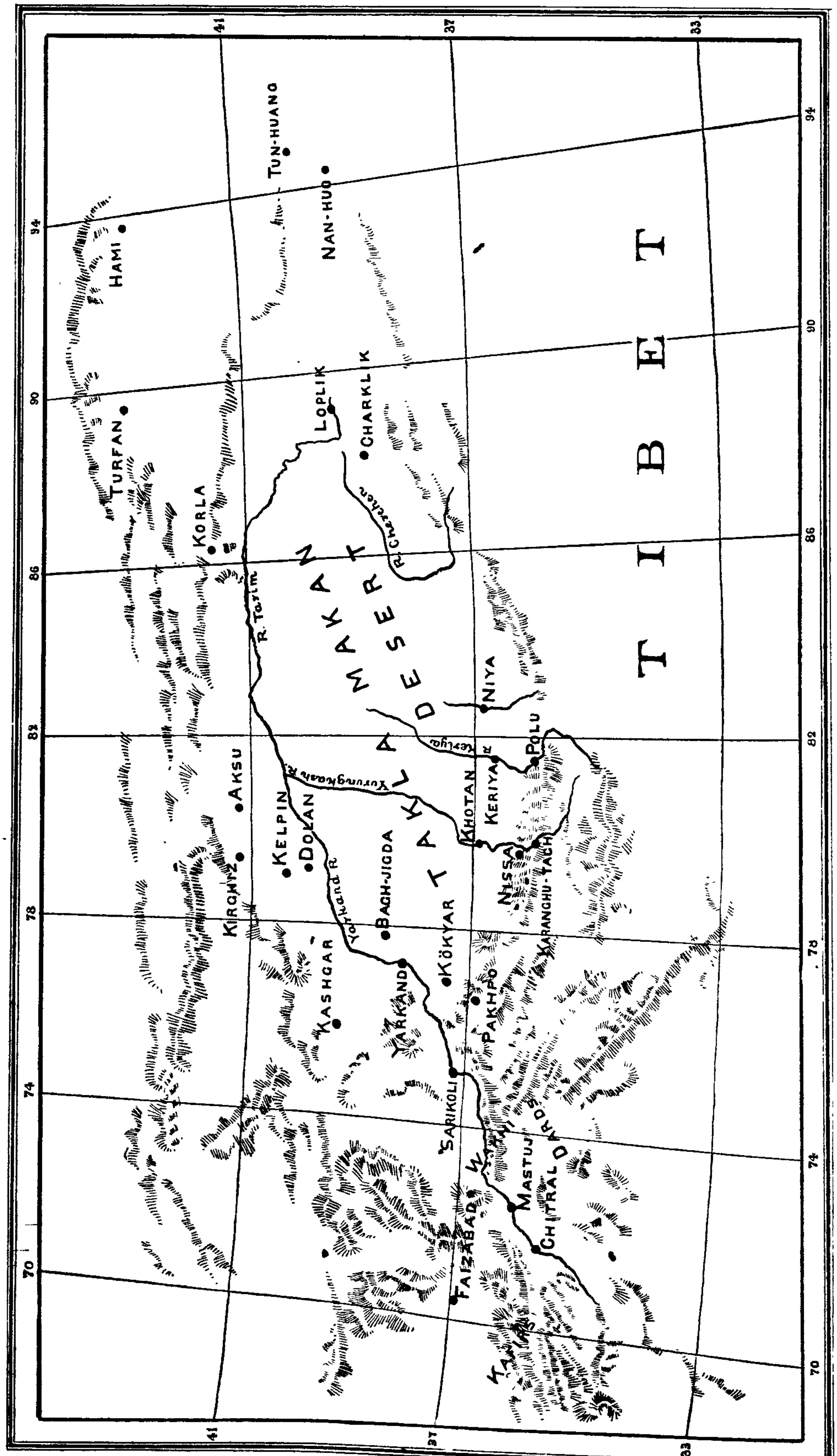


FIG. 1.—SKETCH-MAP OF CHINESE TURKESTAN AND THE PAMIRS, TO SHOW THE POSITION OF THE TRIBES MENTIONED IN THE ACCOMPANYING PAPER.

obtaining $\Sigma\Delta$. For the values excepted above, and for the calculations which have given $\Sigma\Delta$ for every pair of tribes, I must confess the responsibility, as well as for the handling of all *data* not obtained by Sir Aurel Stein. Finally Sir Aurel has asked me to express his cordial thanks to the Council of the Royal Anthropological Institute for the loan of instruments.

The People.

The geographical position of the various tribes among whom observations were taken is shown on the accompanying map, Fig. 1, and it will not therefore be necessary to say many words concerning them in introduction. Furthest west are the Kafirs of Kafiristan (Plate XXXI, Fig. 1), of whom the greater number measured are cultivators, although nearly a third are herdsmen. North-east of the Kafirs are the people of Faizabad in Badakhshan, and a number of individuals from this locality were measured in Yarkand, whither they had travelled for purposes of trade. Between the Kafirs and Tashkurghan, almost in a straight line, are situated the Chitrali (Plate XXXI, Fig. 2), the Mastuji (Plate XXXII, Fig. 1), the Wakhi (Plate XXXII, Fig. 2), and, around Tashkurghan itself, the Sarikoli (Plate XXXIV, Fig. 1). Practically all these are cultivators, and all, as well as the Kafirs, are mountain people. East of the Wakhi, in the mountains which fringe the south-western portion of the Taklamakan desert, are the Pakhpo (Plate XXXIII, Fig. 1), practically all herdsmen; further east, still keeping to the high country, are the people of Nissa and Karanghu-tagh, inhabitants of penal settlements and therefore of very mixed composition. They are herdsmen in the main, but a fair number are cultivators. East of them, still in the high ground, is the people of Polu, purer than the last, and cultivators in the main. Descending to the edge of the desert, we find, to the north-east of the Pakhpo, the people of Kökyar (Plate XXXIV, Fig. 2), mainly cultivators; north of Karanghu-tagh is Khotan (Plate XXXIII, Fig. 2), peopled chiefly by cultivators, with a sprinkling of artizans; north of Polu is Keriya, mainly herdsmen with a smaller number of cultivators; and, east of the last, Niya (Plate XXXV, Fig. 1), entirely cultivators.

Returning to Kökyar and proceeding north round the western edge of the desert, we find the people of Bagh-jigda, an outlying settlement of Yarkand, cultivators. Turning eastward along the northern edge of the desert we have the Dolans of Tumshuk, now agriculturists, but until quite recently herdsmen. North of them, and off the trade-route, is the people of Kelpin, chiefly cultivators. Further north, in Uchturfan, are the Kirghiz (Plate XXXIV, Fig. 3), mainly herdsmen, and now little exposed to external influences. East of the last is Aksu (Plate XXXIV, Fig. 4), situated on the main route, and often recolonized, agricultural in the main, but with a certain number of traders. Some way further east is the people of Korla, mainly agricultural, and, north-east of the last, Turfan. The population here, principally agricultural, is probably rather mixed, since the dress is Chinese, though the people themselves have spoken Turki since the sixth century. Chinese influence is even more marked in Hami, eastward of

Turfan, since it is on the Chinese military route; the measurements are chiefly of cultivators. To the south are the cultivators of Tun-huang and Nan-huo, Chinese immigrants, to whom allusion is made below simply as "Chinese."

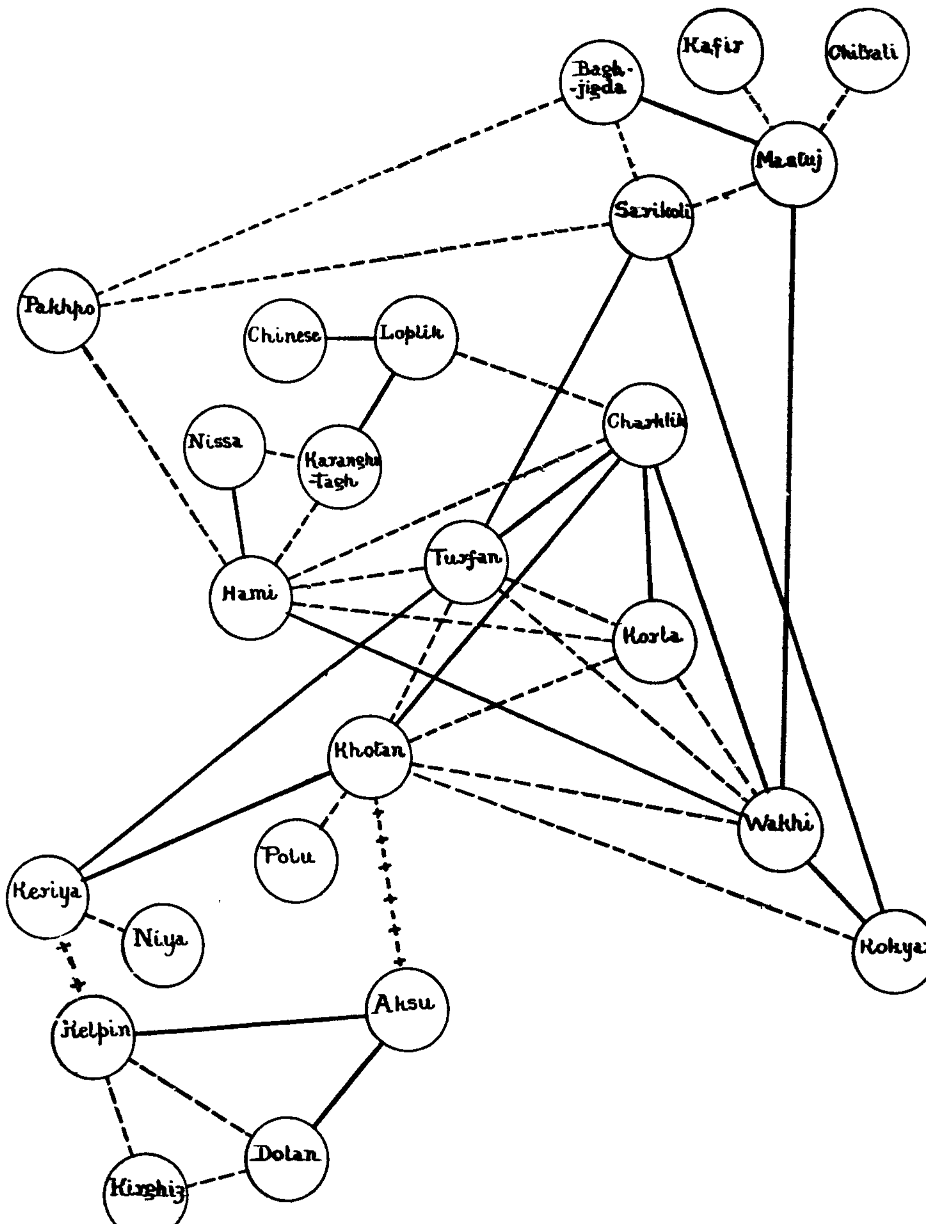


FIG. 2.

Finally, west of the last, immediately west of Lop-nor, on the southern edge of the desert, are the Loplik (Plate XXXV, Fig. 2) and Charklik, the former being the remains of an old fishing population who practised practically no agriculture, the latter, a mixture of agricultural colonists, coming mainly from Khotan. It should

perhaps be noted that the professions given above are those of the individuals measured and not necessarily those of the different settlements as a whole.

Head-length.

Tables 1 *and* 6.—If the means of absolute head-length are seriated, it will be seen that extremes are constituted by the Aksu (M = 194) and the Loplik (M = 194). Close to the Aksu, at the lower end of the scale, come their geographical neighbours, the Kelpin, Kirghiz, and Dolan, together with the people of Faizabad. At the other end, the Chinese follow the Loplik, and the Charklik are not far off. The Kafirs are grouped among the longest heads, and the mountaineers generally show a tendency to long-headedness, the Pakhpo, Chitrali, and Mastuji falling all in a bunch. The Sarikoli, however, come lower down. The people of Khotan, Turfan, Korla, and the Wakhi fall close together about the centre.

Head-breadth.

Tables 1 *and* 6.—As regards this absolute, the extremes are the Chinese (146) and the Kirghiz (161). Near the Kirghiz are the Dolan, Kelpin, Faizabad, and Aksu, somewhat overlapped by the Wakhi, Turfan, and Korla, who also fell together in the last table; in this case Khotan is lower down the scale. Among the lowest means are the mountaineers (except the Wakhi), the Kafir following upon the Chinese; in fact in this case the Kafir separate the last from the Loplik. The rest fall in the middle of the scale.

Cephalic Index.

Tables 1 *and* 6.—In this the extremes are the Chinese (77) and Aksu (89). With the latter are grouped the Kirghiz and Kelpin as the most brachycephalic, followed at a little distance by the Dolan and Faizabad. Towards this end of the scale also fall the people of Niya, Keriya, Korla, and Kökyar. At the more dolichocephalic extremity the Chinese are followed by the Kafirs and other mountaineers except the Sarikoli, whose absolute head-length is rather low, and the Wakhi, who, as in their absolutes, fall nearer Turfan, Khotan, and Korla. Near the Chinese, among the most dolicocephalic, are the Loplik.

Having regard to the two absolute measurements of length and breadth, and the index, a propensity can be seen for the Kirghiz, Kelpin, Dolan, Aksu, and Faizabad to fall to one end of the scale, and for the Chinese, Loplik, and mountaineers to fall at the other (except the Wakhi and Sarikoli). The rest, including the Sarikoli and the Wakhi, fall in the middle, with a tendency to overlap the first group, except in respect of absolute head-length, in which they are distributed fairly evenly along the whole scale. It must be remembered that the people of Karanghu-tagh and Nissa, though reckoned as "mountaineers," are very mixed.

Nasal Length.

Tables 2 *and* 6.—The extremes are the Chinese (45) and Faizabad (54). Close to the latter come the Aksu and Dolan, the Kirghiz and Kelpin falling this time about the middle of the scale. The mountaineers show great divergence; on the one hand, the Kafir and Mastuji have short noses, the Karanghu-tagh, Chitrali,

Wakhi, and Nissa, long noses. In the same way the people of Keriya and Niya show very low nasal lengths, and those of Kökyar are high up the scale. The Loplik again approximate to the Chinese.

Nasal Breadth.

Tables 2 *and* 6.—Extremes, Chitrali (32), Dolan (40). This time the grouping, with one or two important exceptions, supports the general conclusions formed from the head-measurements. The mountaineers are at one end of the scale, the Dolan, Kelpin, and Kirghiz at the other. With the first are reckoned the Chinese, followed closely by the Loplik. The exceptions are as follows :—Aksu and Faizabad fall in the middle instead of with the Dolan, etc.; Nissa and Karanghu-tagh fall at some distance from the hillmen of the Pamirs, and are grouped with Khotan, Kökyar, Turfan, and Keriya; while the Wakhi and Sarikoli show the narrow noses characteristic of the neighbouring hill tribes. The position of the Bagh-jigda at this end of the scale should be noted.

Nasal Index.

Tables 2 *and* 6.—Extremes, Chitrali (64) and Niya (82). Again the Kelpin, Dolan, and Kirghiz fall near together, among the most platyrrhine, though this time Aksu and Faizabad are at the other end of the scale, near the mountaineers. It is interesting to note the rather high index of the Chinese, due almost entirely to the extreme shortness of their noses. Near them, though less platyrrhine, owing to their superior nasal length, are the Loplik. The Wakhi and Karanghu-tagh fall next one to another, both with a high degree of leptorrhinity. Turfan, Hami, and the Charklik hold a corresponding position among the platyrrhines.

On the whole the nasal measurements support the conclusions inferred from the head-measurements. The Kirghiz, Kelpin, and Dolan remain as members of a distinct group, though it is now seen that Aksu and Faizabad differ from them in some respects. It should be noted, however, that their leptorrhinity is due to the great length of their noses, while that of the Chitrali, Sarikoli, and Kafir is the result of relatively extreme narrowness of nostril. The Wakhi show a belated tendency to group themselves in certain respects with their geographical neighbours, while Karanghu-tagh and Nissa display occasional affinities with the peoples of the desert fringe, Kökyar, Polu, Khotan, Korla, etc. On the whole the Chinese and Loplik appear still to fall nearer each to the other than to the rest. Bagh-jigda displays occasional similarities to the mountaineers.

Facial Breadth.

Tables 3 *and* 7.—Extremes, Kafirs (116), Dolan (146). This is one of the most valuable characters of all, since the variation between people and people is very great, while the variability of the respective means is comparatively small. It is all the more pleasing, therefore, to find that the evidence of the head-measurements, as modified by that afforded by the nose-measurements, receives additional support. The mountaineer tribes, Mastuji, Chitrali, Pakhpo, Sarikoli,

follow immediately upon the Kafir. At the other end Faizabad, Kirghiz, Kelpin, and Aksu (with Polu intervening between the two last) follow the Dolan. Additional evidence of the relationship of Bagh-jigda with the Pamir mountaineers is afforded by their position between the Chitrali and Pakhpo; while the tendency of Nissa and Karanghu-tagh to approximate to the desert folk is exhibited by their position in the middle of the scale. The place of the Wakhi, between the most euryprosopic of the Pamir peoples and the most leptoprosopic of the desert population, is equally illuminating; and the Loplik take the position we might expect, about midway between the Chinese, with whom they have so often been related, and their neighbours the Charklik, who, in their turn, stand very near the people of Khotan, their principal mother-village.

Total Facial Length.

Tables 3 *and* 7.—Extremes, Loplik (111), Faizabad (121). This is not nearly so useful a character; there is little difference between the highest and lowest means, and their variability is comparatively very great. To follow the fortunes of the groups into which, on the evidence of former measurements and indices, the peoples seem to fall, the Aksu come next to the Loplik, with a mean of 112, and are thus widely separated from Faizabad. The Dolan, Kelpin, and Khirghiz fall about the middle, the first in the direction of length of face, the two latter in the direction of shortness. The Pamir mountaineers, including the Wakhi, but not the Chitrali, show a tendency to mass themselves towards the short-faced end of the scale, and thus for the first time are brought into some relation with the Aksu, Kelpin, and Kirghiz. Nissa also appears at this end, but Karanghu-tagh is at the other end, with Turfan, Khotan, Kökyar, and Korla. To complete the confusion, the Chinese have a length 117, and are, therefore, some distance from the Loplik.

Total Facial Index.

Tables 3 *and* 7.—Extremes, Kirghiz (79), Kafir (97). The evidence of this index is far more valuable, since the variability of M is much less; it is also more pleasant to contemplate, since it corroborates that afforded by the facial breadth, and we return to our original grouping. The Kirghiz, Dolan, Kelpin, and Aksu appear as the most euryprosopic, with Faizabad very near. The Kafir, Chitrali, and Mastuji figure as the most leptoprosopic, followed closely by the Pakhpo and Sarikoli; Bagh-jigda falls between the last two. The desert population, including Karanghu-tagh and Nissa, occupy the middle of the scale, Polu and Keriya being the most euryprosopic, Hami and Kökyar the most leptoprosopic. The grouping of the Loplik with the first pair and the Chinese with the second, however, shows that the difference between the two, as evidenced in their respective facial lengths, is significant.

Upper Facial Length.

Tables 4 *and* 7.—Extremes, Keriya (64), Kökyar (70). Again, as with the total facial length, we have a small difference between means accompanied by

great relative variability. The most interesting point lies in the fact that the extremes are constituted by two members of the desert population. As in the case of the total facial length, the Pamir peoples on the whole mass themselves towards the lower end of the scale, while the Kelpin, Kirghiz, Aksu, Faizabad, and Dolan are distributed in ascending order about the central portion. An important difference is constituted by the fact that the Chinese and Loplik in this case lie next one to another each with a high figure.

Upper Facial Index.

Tables 4 *and* 7.—Extremes, Kirghiz and Dolan (46), Chitrali (56). This index gives a verdict very similar to the total facial, with one very important difference, viz.: that the Chinese and Loplik are again brought closely together. This shows that the difference existing between them lies solely in the superior length of the chin among the Chinese. Again the Kirghiz, Dolan, Kelpin, Faizabad, and Aksu form the most euryprosopic group, the Pamir people the most leptoprosopic, though the Sarikoli stand a little apart. Bagh-jigda also has a low index, and the Chinese an even lower. The desert folk occupy the centre of the scale, Polu extending into the euryprosopic portion, Kökyar into the leptoprosopic. Nissa and Karanghu-tagh are on the leptoprosopic side of the centre, as is also Hami, doubtless, as regards the latter, owing to the influence of the Chinese.

Head-Circumference.

Tables 4 *and* 6.—Extremes, Kökyar (537), Loplik (576). Here M shows great variation, which unfortunately is obviated by an almost more than proportional variability. The Chinese and Loplik fall together, but the Pamir peoples are divided into two, the Mastuji, Kafir, and Chitrali showing a high figure, the Pakhpo and Sarikoli a low. The members of the Kirghiz group are distributed at intervals about the central portion. Owing, however, to the great variability, due possibly in part to the difficulty of making accurate measurements, the evidence afforded by these figures is not of great value.

Stature.

Tables 5 *and* 7.—Extremes, Nissa (160), Loplik (170). Also a measurement of no great value, owing to the slight variation of M and its great individual variability. The Aksu, Kirghiz, Dolan, and Kelpin form a group on the short side of the centre. The Pamir peoples and the desert folk are distributed fairly equally along the whole line. All that can be said is that the former tend to mass towards the tall end, the latter towards the short.

Span.

Tables 5 *and* 7.—Extremes, Nissa (160), Faizabad (173). Again the Pamir mountaineers show a wide distribution, with a tendency to mass towards the higher

end of the scale. This tendency is even more marked among the Kirghiz group, while the desert peoples are nearly all at the other end. The Chinese and Loplik show considerable divergence.

Stature-Span Index.

Tables 5 *and* 7.—Extremes, Keriya (99), Kelpin (104). This shows a result more in accordance with the more important measurements. With the Kelpin are grouped Faizabad, Kirghiz, Aksu, and Dolan, all having a high index. This group is over-lapped by Bagh-jigda, which is followed by the Pamir peoples, Kafir, Mastuji, Chitrali, Sarikoli, Wakhi, and Pakhpo, in their turn overlapped by Kökyar, Charklik, and Niya. The Loplik and Chinese fall towards the other end, and beyond them come Karanghu-tagh and Nissa.

The Differential Index.

Table 8 shows the $\Sigma\Delta$ for each pair of tribes, obtained as described on p. 451. Any $\Sigma\Delta$ which contains among its factors a Δ amounting to 1, or over, is printed in italics, unless the Δ which reaches a whole number is that derived from the head-circumference. An exception has been made in this case owing to the great individual variability of this measurement. Another exception is furnished by the $\Sigma\Delta$ for Keriya and Niya. In this case Δ for the stature-span index is 1·00, yet the M for Keriya is calculated from only five individuals, and the variability of this measurement is great in proportion to the small difference which exists between the extremes. Moreover the population respectively of Keriya and Niya show remarkably little difference in other respects (since the $\Sigma\Delta$, in spite of the fact that one of its 15 factors is a whole number, is only 3·64): consequently their $\Sigma\Delta$ has been printed in ordinary type, and it may be allowed that a close relationship exists between them.

Let us first regard the table from the point of view of similarity. The lowest $\Sigma\Delta$ is that for Turfan and Korla, which though it contains 15 factors amounts only to 2·03. This remarkably low figure shows clearly that the populations of the two localities are not merely closely related but practically identical. Two other $\Sigma\Delta$ fall below 3, viz., Turfan and Khotan (2·98) and Kirghiz and Dolan (2·84), and indicate nearly as close a relationship between these pairs of tribes relatively. (See Table 9, which shows more clearly the interrelation of the various tribes; names in italics indicate that the $\Sigma\Delta$ contains a Δ as factor which amounts to 1·00 or over with the exceptions noted above.) If the $\Sigma\Delta$ is raised to 4, we find that the Dolan, Kelpin, and Kirghiz form a closely-related group of three, that the Wakhi are related to Turfan, that Keriya pairs with Niya, and Bagh-jigda with the Sarikoli. To anticipate, therefore, we have the nuclei of three groups, the Kirghiz group, the Turfan group, to which one mountain people, the Wakhi, are closely related, and the Pamir group, with an outlying branch at Bagh-jigda. If the $\Sigma\Delta$ be raised to 5, these groups materialize more distinctly. It is now seen that Turfan, Korla, Khotan and Wakhi are all interrelated by $\Sigma\Delta$ under 5; and that Turfan, Korla and Hami stand in similar relationship. Further that Sarikoli, Bagh-jigda, and Pakhpo constitute a similar group; while the Kirghiz-Kelpin-Dolan group remains

unchanged. For convenience the first group will be called the Desert group (although it includes the Wakhi), the group containing the Sarikoli, the Pamir group; and the last, the Kirghiz group. Now if we look at the Mastuji we see that they are related to the Pamir group through the Sarikoli, and have, besides, affinities with the Kafir and Chitrali; again it is apparent that the Pamir group is brought into contact with the Desert group owing to a relationship existing between the Pakhpo and Hami, while Kökyar and Polu show a connection with the Desert group through Khotan, and Karanghu-tagh through Hami. Other close relationships are those between Karanghu-tagh and Nissa, and between Loplik and Charklik. Fig. 2 shows these interrelationships in diagrammatic form, the broken lines indicating $\Sigma\Delta$ under 5.

If the limit of the $\Sigma\Delta$ be raised to 6 (see Fig. 2, solid lines), we find that the Mastuji can be related with the Bagh-jigda as well as the Sarikoli, and though their $\Sigma\Delta$ as regards the Pakhpo is over 6, being in fact 6·27, yet the excess is so small that we may fairly regard them as belonging to the Pamir group. The $\Sigma\Delta$ for the Kafir and Chitrali falls below 6, being 5·92, but the Δ for the nasal length is 1, and the relationship cannot, therefore, be regarded as so close as that existing between each and the Mastuji. As regards the Desert group, we find this now constituted by Turfan, Korla, Wakhi, Charklik, and Khotan, or by the first four and Hami. The $\Sigma\Delta$ for Hami and Khotan is 6·62, and the factor which brings it above 6 is that for the facial index, 1·33, due to the fact that the people of Khotan are considerably more euryprosopic. Further connection between the Pamir and Desert groups is seen in the relation of the Mastuji with the Wakhi and of the Sarikoli with Turfan. Kökyar, which has already been shown to possess affinities with Khotan, now becomes related to the Wakhi, and also with the Pamir group through the Sarikoli; Keriya becomes attached to the Desert group through Khotan and Turfan, while similar relationships are seen to exist between Nissa and Hami, between Karanghu-tagh and the Loplik, and between the latter and the Chinese. The Kirghiz group also receive an addition in the Aksu, who become related to the Kelpin and Dolan, their $\Sigma\Delta$ as regards the Kirghiz themselves being only just over 6, viz., 6·20. This excess is due solely to head-circumference, which, as has been shown, does not afford trustworthy evidence. As yet this group has shown no relationship to either of the others, but, as a matter of fact, it lies far nearer to the Desert group than to the Pamir group. The $\Sigma\Delta$ of Aksu and Kelpin only just misses inclusion in the present limit, being 6·20, and containing no factor over 0·90; $\Sigma\Delta$ for Keriya and Kelpin, too, is only 6·82, though in this case Δ for the stature-span-index amounts to 1·67. Other affinities, besides those already mentioned, appear between the Pamir and Desert groups, though in each case the $\Sigma\Delta$ contains a Δ of 1 or over; they are the following, the words in brackets indicating the particular in which Δ attains or exceeds unity. Pakhpo and Karanghu-tagh (facial breadth), Pakhpo and Polu (facial breadth), Pakhpo and Nissa (facial breadth and stature-span index), Sarikoli and Hami (nasal breadth), Sarikoli and Khotan (facial breadth). It is obvious from this that the main particular in which the two groups differ is facial breadth, but that in the case of

the Wakhi this difference does not occur. It is interesting to note that the average of the $\Sigma\Delta$ of the Wakhi is the lowest, and never attains 10.

One people, that of Faizabad, has not been related at present to any other, and it is a fact that in no case has it a $\Sigma\Delta$ which does not contain a factor under 1. Its lowest $\Sigma\Delta$ are with Khotan (6·59, Δ for span and stature-span index being over 1), and with Aksu (6·73, Δ for facial breadth and head-circumference being over 1). Its position is perhaps mid-way between the Desert and Kirghiz groups, with a slight leaning towards the latter, owing to the great variability of head-circumference.

Table 10 shows the inverse order of relationship of the various peoples, and perhaps the differential index affords a better indication of remoteness than of affinity. The highest $\Sigma\Delta$ exists between the Kafir and Dolan, viz., 16·28; and, as far as $\Sigma\Delta$ of 13 and over are concerned, the antithesis between the Pamir group and the Kirghiz group, and between the latter and the Chinese, alone appears. It is true that the names of Karanghu-tagh and Nissa occur, but these, as we have seen, have a very mixed population, and it is evident that the population contains a large Pamir element. With regard to $\Sigma\Delta$ of 12 and over, we find certain of the Desert group, viz., Khotan, Keriya, and Korla opposed to the Kafir. As we have seen that the Pamir group have a certain relationship with the Desert group, we may take it that the Kafir, who are after all only related with the former through the Mastuji, constitute an extreme, and bear a certain relationship to some people whose influence does not extend as far as the desert. The Loplik, too, appear as widely divergent from the Kirghiz group, as might be expected owing to their relationship with the Chinese. The difference, which tends to separate the people of Faizabad from the Pamir peoples and the Chinese, accentuates the traces of relationship which have already been found for them with the Kirghiz group. It is unnecessary to pursue the investigation further in great detail, but attention may be called to one or two points. When $\Sigma\Delta$ of 10 and over are considered, it is seen that the Chinese, who have already shown a divergence from Niya, are differentiated from Keriya, and, what is more important, from Korla, one of the Desert group. Among the Pamir group the Chitrali must be regarded as influenced by some extraneous element, probably that which enters into the composition of the Kafir since they are brought into opposition with Turfan and Korla. Kökyar, which has been related most closely with Khotan, and next with the Sarikoli, is differentiated from the Kafir, Kirghiz, and Loplik, the last being, as we know, closely related to the Chinese. To establish the position of the last named and of the Wakhi, it is necessary to consider the $\Sigma\Delta$ of 9 and over. We then find that the Chinese are widely separated from the Kirghiz and Desert groups; that they are not related to the Pamir peoples is evident from the fact that their $\Sigma\Delta$ for the Chitrali and Sarikoli are over 8. They, therefore, constitute an extreme. As for the Wakhi, they are shown to have no relationship with the Kirghiz group by being opposed to the Kirghiz themselves, while their $\Sigma\Delta$ for the Kafir is over 8. The position of Keriya and Niya is interesting. They show the greatest divergence from the Pamir group and the Chinese, but differ, though in a lesser degree, from Faizabad and the Dolan. Keriya, however, has been shown to bear some sort of relationship to

Kelpin, while its $\Sigma\Delta$ for the Charklik, one of the Desert group, is over 8. Keriya probably, therefore, occupies an intermediate position, or, together with Niya, which is further removed from the Kirghiz group, contains some extraneous element. The $\Sigma\Delta$ of Faizabad and the Kirghiz, which is over 8, shows that the former cannot be definitely included in the Kirghiz group, and, therefore, probably stands half-way between the latter and the Desert group, especially as it bears some slight affinity with Khotan.

Conclusions from the Measurements.

The foregoing examination would seem to establish the fact that the various peoples with which this paper deals may be divided into four groups. First, a group of mountain folk, all closely allied, in the extreme west of the area under consideration. The nucleus of the group is formed by the Sarikoli, Mastuji, and Pakhpo, with an easterly extension into the Desert area in the shape of the Bagh-jigda. Closely akin to them are the Chitrali and Kafir, who, nevertheless, exhibit certain differences without approaching any of the other peoples, and, therefore probably contain some element foreign to this district. Second, a group of desert peoples, the nucleus of which is composed of Turfan, Khotan, Korla, and Charklik. This group has a westerly extension into the mountains in the shape of the Wakhi; it possesses certain affinities with the peoples forming the nucleus of the former group, and the inhabitants of some localities, such as Kökyar and the mixed populations of Karanghu-tagh and Nissa, appear to stand half-way between the two. With the Desert group should be classed the people of Polu and the rather mixed population of Hami; Niya and Keriya also have some affinity with certain of its members, but seem to contain some other element also. However, their apparent aloofness may be due to the small number of measurements available. The third group, one which is very distinct, is formed of the Kirghiz, Kelpin, Dolan, and Aksu. Traces of relationship with the Desert group, however, are not wanting, though these are slight, and the people of Faizabad may represent a mixture of the two elements, or, indeed, all three, Pamir, Desert, and "Turki." The fourth group, the Chinese, seems to stand practically alone, though the Loplik are evidently related to them, and so form a connecting link with the Desert peoples. The most interesting point about the Chinese is their obvious differentiation from the Kirghiz, who have been said to be the nearest related to the Mongolians of all Turki peoples. A possible explanation is not very far to seek, however; if the measurements given by Deniker in *The Races of Man* be considered, it will be seen that the data collected among the people of Nan-huo and Tun-huang correspond very closely with those quoted by him for the Northern Chinese, while the measurements of the Kirghiz and Dolan approximate very closely to those given for various Southern Mongolian peoples, with the exception of the stature. It may well be that the Kirghiz group represent a blend of the Southern Mongolian with the "Turkish" stock.

Descriptive Characters.

It will be as well to survey shortly the descriptive characters of the peoples

here studied, though material of this nature is less exact and more difficult to handle than actual measurements. In the first place, the eye of the observer must be influenced by an unconscious tendency to make comparisons with the last people studied, in the second, the reduction of data to percentages, the only method which renders comparison possible, is apt to be misleading when the number of observations is few, as in the case of Faizabad, Korla, Bagh-jigda, Aksu, and Nissa.

Skin-colour. Table 11.—In all cases, with two exceptions, the bulk of the population falls under the head of "white-rosy." The exceptions are the Dolan, of whom 75 per cent. are "brownish-white," and the Chinese, with 65 per cent. "yellow." The Kirghiz, Kelpin, Faizabad, and Aksu have respectively 42 per cent., 26 per cent., 25 per cent., and 23 per cent. "brownish-white," and the Kelpin and Aksu 7 per cent. and 15 per cent. "yellowish-white" also. The only peoples who contain a definitely "brown" element are the Kafir, 22 per cent.; Karanghu-tagh, 8 per cent.; and Mastuji, 4 per cent. (with another 4 per cent. "brownish-yellow"), two of them being classed by their measurements as belonging to a definite group, and one as having affinities with that group. The other tribes are either entirely "white-rosy" (the rest of the mountain folk belong to this category) or "white-rosy" in the main with varying percentages "brownish-white" and "yellowish-white." Korla and Turfan, both of which have been subjected to Chinese influences, have small percentages of "yellows."

Hair-colour. Table 12.—The individuals have been grouped under three headings: (*a*) black, (*b*) dark-brown, (*c*) medium and fair. In six cases the bulk of the population is black-haired; the Chinese (75 per cent.), Kirghiz (50 per cent.), Kelpin (47 per cent.), Korla (46 per cent.), Nissa (44 per cent.), and Loplik (40 per cent.). The Dolan have an equal percentage (44 per cent.) of blacks and dark-browns. The Chinese, therefore, and the members of the Kirghiz group show a tendency, most marked in the case of the first, towards nigrescence; the Loplik naturally have been affected by the Chinese. The small number of Nissa observations (9) invalidates the figure for this people. One people only, that of Niya, has the bulk of its population medium (47 per cent.); other tribes which show a tendency towards fairness are, Pakhpo (32 per cent. medium or fair and no blacks), Wakhi (32 per cent.), Karanghu-tagh (31 per cent. and no blacks), Sarikoli (30 per cent.), Kafir (28 per cent.), Kökyar (26 per cent.), and Loplik (26 per cent., though here, as we have seen, the bulk of the population is black-haired). As regards the rest generally, the other members of the Pamir group have a very high percentage of dark-browns; the Desert folk a lower percentage of dark-browns, with a higher percentage of blacks, and, in a few cases, of mediums.

Hair-quality. Table 12.—Three categories, straight, wavy, and curly. This gives interesting results; the Chinese show 95 per cent. straight. The Kafir, in the matter of skin- and hair-colour so far removed from them, alone of the rest display a straight-haired element (28 per cent.), for the one straight-haired individual at Khotan may be regarded as negligible. Aksu, Kelpin, Dolan, and Kirghiz are entirely wavy-haired, and Faizabad shows 83 per cent. wavy, the rest curly. With the exception of a single wavy-haired individual at Keriya, the

remaining Desert and Pamir peoples are entirely curly. This result gives strong support to the measurements, and implies the isolation of the Chinese, the approximation of the Pamir and Desert groups, the presence in the Kafir of some foreign element, probably derived from the west, the specialized character of the Kirghiz group, with the people of Faizabad standing between them, on the one side, and the Desert and Pamir populations on the other.

Hair amount (face). Table 12.—Two categories: (*a*) abundant and moderate; (*b*) scanty and nil. Shaven individuals are, of course, not included. In this respect the mountain peoples fall in the first category, with the exception of the Pakhpo, who show 8 per cent. scanty. Again the Chinese constitute an extreme, with 70 per cent. in the second category (50 per cent. being "nil"). The Kirghiz stand near them with 71 per cent. in the second category (11 per cent. being "nil"). The hair growth of the rest of the Kirghiz group appears to have been affected by the neighbourhood of the Desert population, the figures being, Aksu, 46 per cent. (*b*); Dolan, 25 per cent. (*b*); Kelpin, 14 per cent. (*b*); Faizabad, 8 per cent. (*b*). However, the Desert people themselves display an occasional glabrous tendency, which is accentuated in such places as Hami (47 per cent.) and Turfan (54 per cent.), where Chinese influence appears in the ethnography, and it is possible that the comparative hairiness of Faizabad is due to some affinity, of which traces have been seen before, with the Pamir peoples. The Loplik stand near the Chinese with 63 per cent. of individuals with glabrous tendencies, but the position of the Charklik, with 67 per cent. of such individuals, is rather surprising; also that of Kökyar (31 per cent.), who have hitherto been regarded as a Desert people with a tendency to approximate in some particulars to the mountain folk.

Eye-colour. Table 13.—Three categories, dark, medium, and light (including blue). On the whole the Desert peoples seem to have the most deeply pigmented eyes, though the light hair seen at Niya is accompanied by 30 per cent. of light eyes. At Aksu, Polu, Hami, Korla, and among the Charklik and Dolan, no light eyes are found, and, except in the last case, 50 per cent. or more of the population is dark-eyed. On the other hand, among the Pamir peoples, the Chitrali and Bagh-jigda have no dark eyes, and the highest percentage of the latter, occurring among the Mastuji, is only 14 per cent. Among the Kirghiz and Kelpin the bulk of the population is medium-eyed, with a large percentage of dark eyes and a small percentage of light. The Chinese are mainly dark-eyed (45 per cent.), but a fair sprinkling (15 per cent.) of blue eyes is found. At Nissa and Turfan the great majority of individuals are dark-eyed, but, as regards the rest of the Desert population (except Niya and the places already mentioned), medium eyes are in the majority, though a heavy percentage of dark eyes, and a small percentage of light, are observable.

"Mongolian fold." Table 13.—As regards the fold over the caruncle the Chinese lead the way with 44 per cent., and Turfan, long exposed to Chinese influence, is second (19 per cent.). Korla, otherwise closely related to Turfan, is third (15 per cent). The Loplik show a percentage of 10, in which the fold or traces of it have been observed; and traces also occur at Hami and Keriya. With regard to the Kirghiz, though the fold itself is said to be absent, yet 37 per cent. of

the individuals measured were said to have "Mongolian eyes." This character is interesting as showing the limited extent of Chinese influence in the area under consideration.

The other "descriptive characters," shape of face and nose, give practically no results.

Comparison with Other Peoples.

In order to attempt to fix more definitely the racial affinities of the peoples under discussion, it will be well to consider the physical characteristics of one or two peoples to the west and south. For this purpose I have calculated $\Sigma\Delta$ between all tribes mentioned above, and the following (see Table 14). 58 Galcha[1]; a primitive Iranian people inhabiting the mountain district of Karateghin; 80 Pathans,[2] representatives of the Indo-Afghan race; 60 Biloch,[2] also Indo-Afghans, with a strong affinity with the Iranians (Deniker); 44 Dards[4] (Yeshkuns and Chins of Dardistan), whose root-stock is Indo-Afghan (Deniker), though the Yeshkun language has affinities with Turki (Biddulph)[3]; 31 Ladakhi,[4] on the Tibetan border; and 38 Tibetans of Tibet.[2] The $\Sigma\Delta$ have been calculated from the following measurements and indices; head-length, head-breadth, cephalic index, nasal length, nasal breadth, nasal index, stature. As regards the Galcha, however, Ujfalvy does not give the nasal breadths, and consequently this measurement and the nasal index cannot be included.

The Galcha.—Table 15 shows the $\Sigma\Delta$ for the Galcha and all other tribes mentioned; Table 16 the degree of relationship between the Galcha and other tribes. Names and figures in italics signify that the $\Sigma\Delta$ contains a Δ reaching 1 or over. It can be seen at once that, as far as the measurements available are concerned, the Galcha seem closely allied to two very distinct groups, the Wahki and Desert folk on the one side and the Kirghiz group on the other. Unfortunately, Ujfalvy does not give the bizygomatic breadths of the individuals whom he measured, but from indications afforded by hair- and eye-colour it is obvious that the Galcha are very closely allied to the Wakhi, and stand in closer relation to the Pamir peoples than to the Kirghiz group. Their percentages are as follows, and can be compared with Tables 12 and 13. *Hair:* black, 9·4 per cent.; dark brown, 50·2 per cent.; red, 1·9 per cent. (one individual); medium and fair, 37·7 per cent. *Eyes:* dark, 11 per cent.; medium, 60·3 per cent.; light, 20·7 per cent. The $\Sigma\Delta$ shows that the Galcha are definitely opposed to the Chinese, the Ladakhi, and the Indo-Afghans. The fact that their $\Sigma\Delta$ for the Kafir is 4·97 indicates that the element which differentiates the latter people from the Pamir folk proper is evidently not Iranian.

Pathans.—The affinities of the Pathans in terms of $\Sigma\Delta$ are shown in Tables 15, 17, and 18. As regards resemblances, the connection of the three Indo-Afghan

[1] Ujfalvy, *Mission Scientifique en Russie, Sibérie, et dans le Turkestan*, vol. i.

[2] Risley, *Tribes and Castes of Bengal.*

[3] It is worth noting that the languages respectively of Kafirs, Chitrali, and the Dard group as a whole display considerable affinity.

[4] Ujfalvy, *Aus dem Westlichen Himalaja.*

peoples is at once obvious; moreover, the fact that the $\Sigma\Delta$ for the Kafir falls under 3·50, taken with the further fact that Table 18 shows the Pathan to be far removed from the Kirghiz group and from several important tribes of the Desert group leads us inevitably to the conclusion that the element which differentiates the Kafir from the Pamir and Desert peoples is Indo-Afghan.

Biloch.—The same three tables show the affinities of the Biloch, whose higher degree of brachycephaly brings them into relation with the Sarikoli and Mastuji. It has been shown that the Mastuji are closely related to the Kafir, and the Sarikoli to the Mastuji. We may conclude, therefore, that the Biloch contain an appreciable Iranian element, and, possibly, that the Mastuji and Sarikoli may possess a slight, but very slight, Indo-Afghan strain. The latter supposition is problematical, but receives a little support from the fact that these two tribes have on the whole darker hair than the Wakhi, who seem to stand nearest to the comparatively pure Iranian as exemplified in the Galcha.

Dard.—The most interesting point with regard to this people is that they appear closely related to the Chitrali, while their comparatively low $\Sigma\Delta$ for the Kafir, 3·10, is invalidated by a Δ of 1·40 for the nasal length. Now it will be remembered that the $\Sigma\Delta$ for the Kafir and Chitrali was only 5·92, but that Δ for the nasal length was 1·00. We find, therefore, that the Dards differ from the Kafir in the very same respect as the Chitrali, though to a greater degree. The averages for the absolutes are: Dards, 53; Chitrali, 51; Pathan, 50; and Kafir, 46. It is evident that some strain of Indo-Afghan blood enters into the composition of the Chitrali, and it is difficult to account for the shortness of nose among the Kafirs, a characteristic which is shared, though to a less degree, by the Sarikoli and Mastuji. This shortness of nose cannot be due to Galcha influence, since the average of that people is 52. Measurements of more of the surrounding tribes are necessary before this point can be elucidated. The Dards show a considerable dis-similarity to the Kirghiz and Desert groups.

Ladakhi.—It is clear that we are badly in need of the facial measurements to define accurately the relation of the Ladakhi to the tribes under discussion. As far as the measurements obtainable go, this people shows affinities with certain of the Pamir group, of the Desert group, and the Chinese and Loplik. At the same time they display a definite divergence from the Kirghiz group. They are probably a very mixed people, and contain Indo-Afghan, Tibetan, and, possibly Pamir elements.

Tibetans.—The most noticeable point about the Tibetans is that their $\Sigma\Delta$ in relation to all tribes is very low. It is strange that the highest should be that expressing their relation with Niya, one of the villages of the southern desert, which appears to be an aberrant member of the Desert group, and which might be supposed to owe its peculiarities to Tibetan influence. On the other hand, there seems to be some kinship between the closely interrelated members of the Desert group and the Tibetans, as was suggested, with respect to Khotan, in my previous paper, to which allusion has been made above.

Final Conclusions.

To sum up, the measurements show that the majority of the peoples surrounding the Takla-makan desert have a very large common element. Further, that this element is seen in its purest form in the Wakhi. The fact that the Wakhi display so close a relationship with the Galcha proves that the basis of the Takla-makan population is Iranian. At the north-western edge of the desert an intrusive element, which can be sharply differentiated from the Iranian, makes its appearance, the Turki element. Besides this there seems to be some common bond between the peoples of the desert and of Tibet. This probably means that the Iranian element has penetrated to Northern Tibet, though it is not unlikely that Tibetan (modified Mongolian) influence has been exercised, *to a slight degree*, upon the Desert peoples. In any case the relationship with Tibet requires confirmation by more measurements taken in the latter country. In the Pamirs is a series of tribes, who, though chiefly of Iranian stock, begin to exhibit slight traces of Indo-Afghan blood. In at least one tribe, the Kafir, these traces are considerably more than slight. The Chitrali also seem to stand in closer relationship to an Indo-Afghan people (but a rather specialized Indo-Afghan people) than the other Pamir tribes. Some admixture has taken place between the Turki and Desert folk. In the case of Aksu the Turki element predominates. In the cases of Niya and Keriya, who should be classed as rather aberrant members of the Desert group, it seems probable that their departure from the norm is due to Turki admixture. Faizabad appears to be a mixture of all three groups, Pamir, Turki, and Desert; and this is what might be expected, the root-stock of the population would thus be Iranian, though it has been exposed to Turki influences since Indo-Scythian times and has thus become somewhat modified. In the East, Chinese influence begins to make itself felt, but only over a very restricted area. Hami, Turfan, and Korla have been thus affected, and it is not unlikely that the Desert people have had some corresponding though perhaps slight, effect upon the population of Nan-huo and Tun-huang. The position of the Loplik is a little difficult to fix. I am inclined to regard them as a very early Mongolian offshoot, who found their way into the Loplik marshes long before Nan-huo and Tun-huang were colonized by Chinese of kindred stock. Owing to long residence they have become affected by contact with the Desert folk. The other alternative is to regard them as a Desert people affected by contact with the Chinese, but, having regard to the slight effect which Chinese influence has had upon Hami and Turfan, in spite of long contact (which has greatly modified their ethnography), I think this is not nearly so probable. The great differentiation of the Chinese and Turki groups is interesting, since both are regarded as "Mongolian." It is evident that they belong to widely different branches of the Mongolian race, and it must be concluded that the Turki are allied to the Southern Mongolian, the Chinese of Nan-huo and Tun-huang (and also probably the Tibetans whose measurements are given) to the Northern Mongolian stock. If this is so, and the Turki peoples do, in fact, contain a large Southern Mongolian element, their stature has been greatly increased in the course of their

wanderings, by contact, probably, with Iranian peoples. This leads us to the question to what extent we may regard the Turki as a distinct branch of Mongolians, and whether it would not be more correct to look upon the various tribes which fall under this heading as being originally mixtures, in varying proportions, of Mongolian and Iranian elements, which time has reduced to comparative homogeneity. Finally, the point which emerges most clearly from the welter of measurements and descriptive data contained in this paper is this: that the original inhabitant of the Pamirs and Takla-makan Desert, including the cities now buried beneath the sand, is that type of man described by Lapouge as *Homo Alpinus*, with, in the west, traces of the Indo-Afghan; and that the Mongolian has had very little influence upon the population. In using the *Homo Alpinus* term, I wish it to be understood that I employ it merely as the name of a certain type already described, and do not necessarily imply that the actual population of the Alps is closely allied to the population of Chinese Turkestan.

In conclusion, I will quote from my previous paper (already cited) the description of these types:—

> "1. A white-rosy race, very brachycephalic, stature above the average, with thin, prominent nose, varying from aquiline to straight, long, oval face, hair brown, usually dark, always abundant and wavy (I think this should now be altered to curly), eyes medium in the main. This is Lapouge's *Homo Alpinus.*
>
> "2. A race, also white, but with a slight tendency to brownish, also very brachycephalic and with stature above the average, nose broader and usually straight, cheekbones broad, hair straighter, darker, and less abundant, eyes dark. The "Turkish" race.
>
> "3. A brown, mesaticephalic, tall type, thin, prominent and aquiline nose, long, oval face, black, wavy hair, dark eyes. This race may be termed the Indo-Afghan.
>
> "4. A brownish, brachycephalic race, stature under the average, nose straight, thick and broad, black, wavy hair, little on face, brown eyes. The Tibetans." (I now doubt whether the Tibetans can be said to constitute a race; there seems to be a great difference between the inhabitants of Northern and Southern Tibet respectively, a difference which corresponds in the main to that between the Northern and Southern Mongolian. Possibly the population of Tibet consists of both the latter elements, with an infiltration from the desert of modified Iranian in the north. More information, however, is necessary before we can speak of Tibet as a whole.)
>
> "5. A yellowish, brachycephalic, short race, short, flattened nose, with broadish nostrils, straight or concave, short, broad face, straight, black hair, scanty on face, dark, oblique eyes, with fold covering the *caruncula*. The (Southern) Mongolian race"

TABLE 1.

Tribe.	No.	Head Length.						Head Breadth.						Cephalic Index.			
		M.	EM.	σ.	Eσ.	C.	EC.	M.	EM.	σ.	Eσ.	C.	EC.	M.	EM.	σ.	Eσ.
1. Kafir	18	190·72	·87	5·48	·62	2·87	·32	146·61	1·13	7·10	·80	4·84	·54	76·88	·49	3·08	·35
2. Chitrali ...	22	186·64	·92	6·42	·65	3·51	·36	149·64	·91	6·33	·64	4·23	·43	80·26	·60	4·20	·43
3. Mastuji ...	28	185·64	·83	6·50	·59	3·50	·32	149·39	·75	5·89	·53	3·88	·35	80·57	·43	3·39	·31
4. Sarikoli ...	40	183·23	·52	4·85	·37	2·65	·20	149·95	·79	7·44	·56	4·96	·37	81·88	·46	4·32	·33
5. Bagh-jigda ...	12	184·42	1·24	6·38	·88	3·46	·48	146·67	·88	4·50	·62	3·07	·42	79·62	·68	3·50	·48
6. Pakhpo ...	25	186·88	·75	5·72	·53	3·06	·29	148·56	·49	3·60	·34	2·42	·23	79·88	·37	2·75	·26
7. Nissa	9	189·56	1·04	4·62	·73	2·44	·39	148·78	·72	3·22	·51	2·16	·34	78·44	·37	1·64	·26
8. Kökyar ...	37	179·19	·63	5·69	·45	3·18	·25	153·22	·67	6·08	·48	3·97	·31	85·44	·39	3·56	·28
9. Karanghu-tagh	21	191·67	1·07	8·72	·91	4·55	·47	149·00	·59	4·02	·42	2·70	·28	77·85	·54	3·69	·38
10. Korla	14	184·21	·91	5·06	·65	2·74	·35	158·21	·65	3·61	·46	2·28	·29	85·96	·60	3·31	·42
11. Wakhi	19	184·74	·95	6·15	·67	3·33	·36	155·68	·91	5·44	·60	3·49	·38	84·81	·60	3·90	·43
12. Turfan	72	183·64	·41	5·13	·29	2·79	·16	156·15	·44	5·50	·31	3·52	·20	85·07	·31	3·92	·22
13. Khotan ...	67	182·50	·52	6·24	·37	3·42	·20	153·47	·45	5·41	·32	3·53	·21	84·21	·36	4·38	·26
14. Hami	21	187·70	·72	4·80	·51	2·56	·38	152·85	·88	5·84	·62	3·82	·41	85·01	·68	4·51	·48
15. Charklik ...	12	190·67	1·78	9·11	1·25	4·78	·66	154·08	1·05	5·39	·74	3·50	·48	81·42	·87	4·46	·61
16. Loplik	38	193·97	·74	6·78	·52	3·50	·27	151·11	·55	5·00	·39	3·31	·26	77·92	·32	2·91	·23
17. Chinese ...	20	192·45	·78	5·18	·55	2·17	·23	145·55	·57	3·77	·40	2·59	·28	76·54	·36	2·38	·25
18. Keriya	21	179·95	1·07	7·25	·75	4·03	·42	154·81	·88	5·97	·62	3·86	·40	86·13	·65	4·58	·46
19. Niya	18	178·44	·79	4·96	·56	2·78	·31	153·83	·94	5·90	·66	3·84	·43	86·30	·61	3·86	·43
20. Polu	31	185·45	·83	6·83	·59	3·14	·28	150·00	·64	5·25	·45	3·50	·30	81·02	·54	4·43	·38
21. Aksu	13	173·92	1·35	7·25	·96	4·17	·55	155·00	1·24	6·62	·88	4·27	·56	89·20	·68	3·65	·48
22. Faizabad ...	12	181·92	1·23	6·30	·87	3·46	·48	155·08	·85	4·25	·60	2·81	·39	85·37	·80	4·12	·57
23. Kelpin ...	15	180·47	1·32	7·58	·93	4·20	·52	156·33	1·06	6·10	·75	3·90	·48	86·73	·72	4·13	·51
24. Dolan	16	182·20	1·12	6·24	·79	3·52	·44	156·47	·91	5·23	·64	3·34	·41	85·39	·84	4·83	·59
25. Kirghiz ...	38	180·50	·70	6·48	·50	3·59	·28	160·84	·42	3·86	·30	2·40	·19	88·18	·39	3·59	·28

TABLE 2.

Tribe.	No.	Nose Length.						Nose Breadth.						Nasal Index.			
		M.	EM.	σ.	Eσ.	C.	EC.	M.	EM.	σ.	Eσ.	C.	EC.	M.	EM.	σ.	Eσ.
1. Kafir	18	46·17	·59	3·94	·41	8·5	·9	32·94	·48	3·05	·34	9·3	·9	72·06	1·34	10·38	·94
2. Chitrali ...	22	50·55	·53	2·74	·38	5·4	·8	32·36	·43	2·52	·30	7·8	·8	64·27	1·21	6·78	·85
3. Mastuji ...	28	46·79	·47	4·62	·33	9·9	·7	33·61	·38	3·12	·27	9·3	·7	72·54	1·07	9·10	·76
4. Sarikoli ...	40	47·60	·39	3·67	·28	7·7	·6	34 02	·32	3·04	·23	8·9	·6	71·95	·90	8·70	·63
5. Bagh-jigda ...	12	45·42	·72	2·68	·51	5·9	1·1	34·92	·61	3·11	·41	8·9	1·1	77·25	1·63	7·40	1·16
6. Pakhpo ...	25	48·68	·50	3·78	·35	7·8	·7	35·68	·40	2·40	·29	6·7	·8	73·80	1·13	7·82	·80
7. Nissa	9	50·00	·83	4·61	·59	9·2	1·2	37·00	·67	2·69	·48	7·3	1·3	74·67	1·89	7·02	1·34
8. Kökyar ...	37	50·59	·41	3·53	·29	7·0	·6	36·73	·33	2·59	·23	7·1	·6	73·00	·93	6·81	·66
9. Karanghu-tagh	21	51·43	·54	4·28	·38	8·3	·8	36·76	·44	3·07	·31	8·3	·9	71·95	1·24	11·10	·87
10. Korla	14	47·71	·67	4·10	·47	8·6	1·0	37·50	·54	2·30	·38	6·1	1·0	78·00	1·51	10·00	1·07
11. Wakhi	19	50·42	·57	2·74	·40	5·4	·8	35·84	·46	3·22	·33	9·0	·9	71·32	1·30	7·44	·92
12. Turfan	72	36·99	·29	2·99	·21	8·1	·4	47·43	·24	3·31	·17	7·0	·5	78·29	·67	7·84	·47
13. Khotan ...	67	49·91	·31	3·81	·22	7·6	·4	36·89	·25	3·08	·18	8·4	·5	74·70	·64	7·83	·46
14. Hami	21	48·48	·54	2·99	·38	6·2	·8	37·81	·44	2·26	·31	6·0	·9	78·90	1·24	6·22	·87
15. Charklik ...	12	47·92	·72	4·14	·51	8·5	1·1	37·92	·58	4·14	·41	10·9	1·1	79·42	1·63	7·55	1·16
16. Loplik	38	47·11	·40	4·18	·29	8·9	·6	35·45	·33	3·03	·23	8·5	·6	75·76	·92	9·84	·65
17. Chinese ...	20	45·20	·56	4·08	·39	9·0	·8	35·10	·45	4·62	·32	13·1	·9	78·20	1·27	12·18	·90
18. Keriya	21	45·71	·43	2·92	·30	6·4	·7	37·00	·39	2·62	·27	7·1	·7	81·24	·98	6·64	·69
19. Niya	18	45·72	·59	3·84	·41	8·4	·9	37·39	·48	2·38	·34	6·4	·9	82·28	1·34	8·06	·91
20. Polu	31	49·90	·45	4·31	·32	8·6	·7	36·45	·37	3·53	·26	9·7	·7	73·39	1·03	7·72	·73
21. Aksu	13	52·85	·69	4·79	·49	9·1	1·0	36·54	·56	3·68	·40	10·1	1·1	70·23	1·57	12·68	1·11
22. Faizabad ...	12	53·67	·72	4·28	·51	8·0	1·1	36·17	·58	3·22	·41	8·9	1·1	67·83	1·63	7·79	1·16
23. Kelpin	15	48·60	·64	3·25	·45	6·7	·9	38·67	·52	3·01	·37	7·8	1·0	79·67	1·46	7·98	1·03
24. Dolan	16	51·19	·62	3·23	·44	6·3	·9	39·94	·51	3·14	·36	7·9	1·0	78·19	1·42	5·18	1·00
25. Kirghiz ...	38	49·26	·40	4·56	·29	9·3	·6	38·21	·33	3·40	·23	8·9	·6	78·13	·92	8·22	·65

TABLE 3.

Tribe.	No.	Face Length.						Face Breadth.						Facial Index.			
		M.	EM.	σ.	Eσ.	C.	EC.	M.	EM.	σ.	Eσ.	C.	EC.	M.	EM.	σ.	Eσ.
1. Kafir	18	112·72	1·06	7·88	·75	7·1	·7	116·06	·92	6·04	·65	5·2	·5	97·17	·92	4·94	·65
2. Chitrali ...	22	116·92	·96	7·27	·68	6·2	·6	121·95	·84	6·47	·59	5·3	·5	96·23	·83	7·12	·59
3. Mastuji ...	28	112·04	·85	8·65	·60	7·7	·5	119·93	·74	7·65	·52	6·4	·4	93·25	·74	5·74	·52
4. Sarikoli ...	40	112·67	·71	6·58	·50	5·8	·4	125·75	·62	4·65	·44	3·7	·3	89·62	·62	5·01	·44
5. Bagh-jigda ...	12	112·33	1·30	8·06	·92	7·2	·8	124·58	1·13	4·92	·80	3·9	·6	90·42	1·12	6·03	·79
6. Pakhpo ...	25	114·60	·90	5·71	·64	5·0	·6	125·64	·78	3·68	·55	2·9	·4	91·28	·78	5·26	·55
7. Nissa	9	113·11	1·50	4·11	1·06	3·6	·9	129·78	1·31	6·45	·92	5·0	·7	87·33	1·30	5·45	·92
8. Kökyar ...	37	117·97	·74	5·61	·52	4·8	·5	129·38	·64	4·94	·46	3·8	·4	92·70	·64	5·22	·45
9. Karanghu-tagh	21	117·24	·98	6·89	·70	5·9	·6	131·20	·86	3·21	·61	2·4	·5	89·48	·85	5·66	·60
10. Korla	14	118·00	1·21	8·12	·85	6·9	·7	131·79	1·05	5·34	·74	4·1	·6	89·14	1·04	5·43	·74
11. Wakhi	19	115·00	1·04	5·24	·73	4·6	·6	128·00	·90	6·19	·64	4·8	·5	89·47	·89	5·98	·63
12. Turfan	72	117·93	·53	5·56	·38	4·7	·3	131·89	·46	4·90	·33	3·7	·3	89·47	·46	5·04	·32
13. Khotan ...	67	117·45	·51	6·20	·36	5·3	·3	136·00	·57	6·96	·41	5·1	·3	86·31	·53	6·48	·38
14. Hami	21	116·67	·98	5·51	·70	4·7	·6	127·62	·85	5·37	·61	4·2	·5	91·71	·85	6·08	·60
15. Charklik ...	12	115·75	1·30	10·45	·92	9·0	·8	134·25	1·13	6·89	·80	5·1	·6	86·25	1·12	4·82	·79
16. Loplik	38	111·13	·73	7·94	·52	7·1	·5	130·79	·64	5·82	·45	4·4	·3	85·00	·63	6·01	·45
17. Chinese ...	20	117·20	1·01	8·31	·71	7·1	·6	127·35	·88	5·77	·62	4·5	·5	92·70	·87	7·11	·62
18. Keriya	21	112·48	·90	6·10	·63	5·4	·6	134·43	·94	6·37	·66	4·7	·5	83·60	·78	5·46	·55
19. Niya	18	112·44	1·06	4·61	·75	4·1	·7	129·56	·92	5·84	·65	4·5	·5	87·05	·92	3·80	·65
20. Polu	31	115·45	·82	6·78	·58	5·9	·5	139·77	·72	4·74	·51	3·4	·4	83·58	·71	5·57	·50
21. Aksu	13	111·69	1·25	8·26	·88	7·4	·8	139·08	1·08	5·95	·77	4·3	·6	80·62	1·08	6·00	·76
22. Faizabad ...	12	121·50	1·30	7·04	·92	5·8	·8	141·92	·13	5·16	·80	3·6	·6	85·67	1·12	5·38	·79
23. Kelpin	15	113·47	1·16	8·11	·82	7·1	·7	141·53	1·01	7·11	·72	5·0	·6	80·20	1·01	5·65	·71
24. Dolan	16	117·12	1·13	6·04	·80	6·9	·7	145·62	·98	5·82	·69	4·0	·5	80·50	·97	4·05	·69
25. Kirghiz ...	38	114·18	·73	7·38	·52	6·5	·5	145·00	·64	6·89	·45	4·8	·3	78·95	·63	6·38	·45

TABLE 4.

Tribe.	No.	Upper Face Length.						Upper Face Index.				Horizontal Circumference.					
		M.	EM.	σ.	Eσ.	C.	EC.	M.	EM.	σ.	Eσ.	M.	EM.	σ.	Eσ.	C.	EC.
1. Kafir	18	63·89	·74	3·93	·52	6·2	·8	55·06	·63	3·43	·44	555·6	2·20	22·0	1·55	4·0	·3
2. Chitrali ...	22	67·64	·67	4·21	·48	6·2	·7	55·68	·57	4·11	·40	555·0	1·99	15·1	1·41	2·7	·3
3. Mastuji ...	28	65·54	·60	4·55	·42	6·9	·6	54·64	·50	3·80	·36	566·4	1·76	15·5	1·25	2·7	·2
4. Sarikoli ...	40	66·05	·50	5·32	·35	8·1	·5	52·45	·42	4·48	·30	543·0	1·48	12·4	1·04	2·3	·2
5. Bagh-jigda ..	12	66·17	·91	3·37	·64	5·1	1·1	53·17	·77	3·30	·54	542·7	2·69	14·6	1·90	2·7	·4
6. Pakhpo ...	25	66·80	·63	4·27	·45	6·4	·7	53·20	·53	3·73	·38	540·6	1·87	11·3	1·32	2·1	·3
7. Nissa	9	67·33	1·05	3·93	·74	5·8	1·1	52·11	·89	4·60	·63	552·8	3·11	12·8	2·20	2·3	·4
8. Kökyar ...	37	69·86	·52	3·66	·37	5·2	·6	54·08	·44	3·48	·31	537·4	1·53	16·9	1·08	3·2	·2
9. Karanghu-tagh	21	68·71	·69	4·85	·49	7·1	·7	52·62	·58	3·89	·41	553·6	2·04	13·9	1·44	2·5	·3
10. Korla	14	67·64	·84	5·28	·60	7·8	·9	51·14	·71	3·90	·50	554·3	2·50	8·4	1·76	1·5	·3
11. Wakhi	19	68·58	·72	5·02	·51	7·3	·8	53·68	·61	4·90	·43	551·8	2·14	16·0	1·51	2·9	·3
12. Turfan	72	67·35	·37	3·95	·26	5·9	·4	51·31	·31	3·48	·22	550·6	1·10	11·7	·78	2·1	·1
13. Khotan ...	44	66·86	·46	4·50	·33	6·7	·5	49·47	·44	4·28	·31	544·2	1·12	11·0	·79	2·0	·1
14. Hami	21	67·10	·69	4·09	·49	6·1	·7	52·57	·58	4·36	·41	553·6	2·04	8·4	1·44	1·5	·3
15. Charklik ...	12	69·83	·91	5·88	·64	8·4	1·0	52·00	·77	2·53	·54	569·2	2·70	14·1	1·90	2·5	·4
16. Loplik	38	68·87	·51	5·17	·36	7·5	·5	52·71	·43	3·98	·31	576·1	1·51	16·3	1·07	2·8	·2
17. Chinese ...	20	68·85	·70	5·54	·50	8·1	·7	54·45	·59	4·47	·42	575·5	2·09	18·3	1·47	3·2	·3
18. Keriya ...	5	64·00	·68	3·35	·48	5·2	1·1	49·20	·94	3·94	·67	546·2	4·10	13·6	2·95	2·6	·5
19. Niya	18	64·56	·74	4·44	·52	6·9	·8	49·22	·63	3·00	·44	542·2	2·20	18·0	1·55	3·3	·3
20. Polu	31	67·74	·58	4·19	·41	6·2	·6	48·68	·49	3·58	·34	550·5	1·70	14·7	1·20	2·7	·2
21. Aksu	13	67·62	·87	4·33	·62	6·4	·9	48·69	·74	3·72	·52	547·3	2·59	13·4	1·83	2·5	·4
22. Faizabad ...	12	67·92	·91	6·71	·64	9·9	1·0	48·08	·77	5·35	·54	549·2	2·70	14·1	1·90	2·6	·4
23. Kelpin	15	65·93	·81	5·15	·58	7·8	·9	46·60	·69	3·49	·49	551·0	2·41	17·8	1·70	3·2	·3
24. Dolan	16	68·06	·79	5·73	·56	8·4	·8	45·87	·66	4·53	·47	557·0[1]	2·41	17·3	1·70	3·1	·3
25. Kirghiz ...	38	66·42	·51	5·19	·36	7·8	·5	45·87	·43	4·61	·30	566·5	1·51	12·8	1·07	2·3	·2

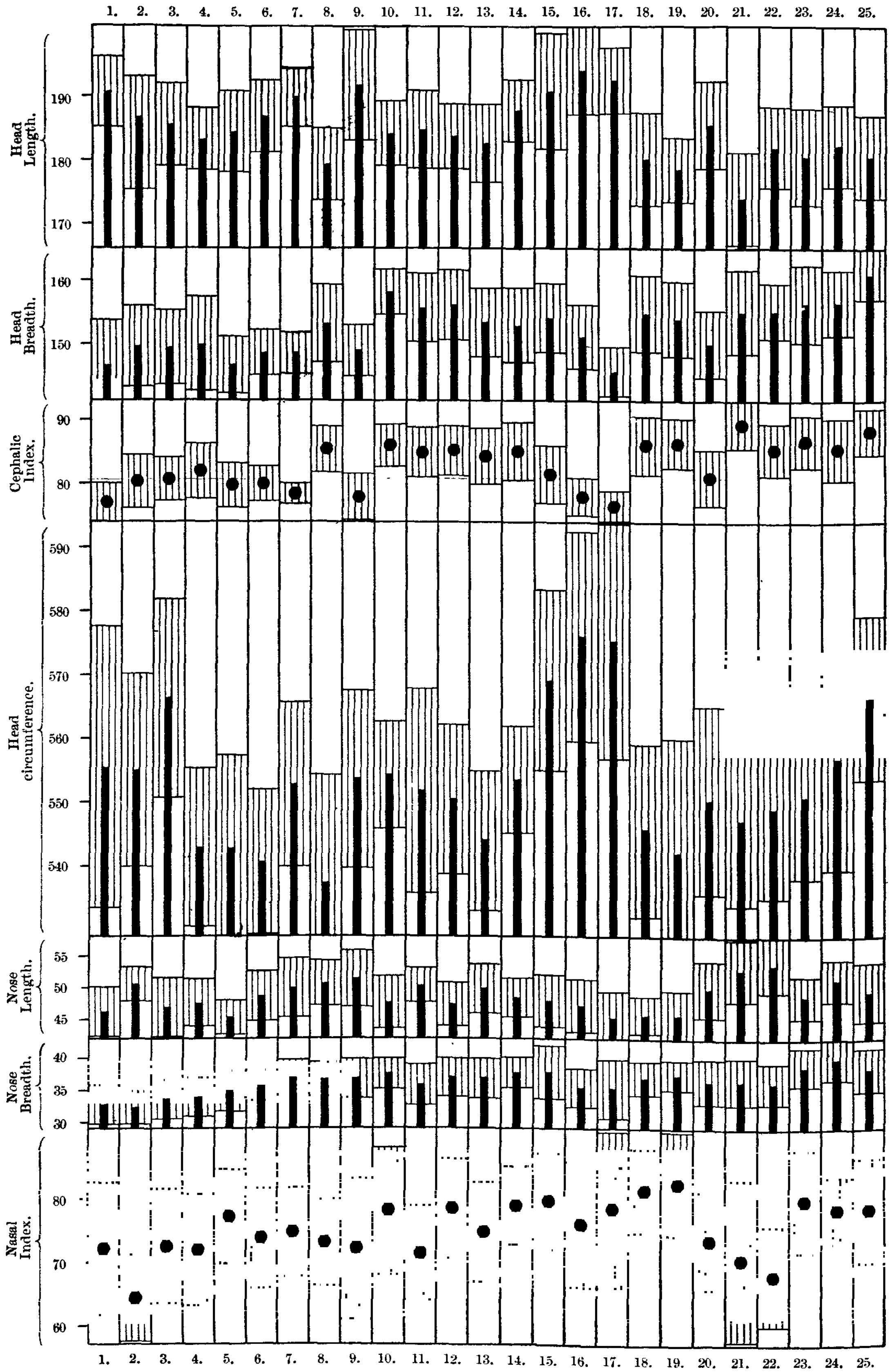
[1] 15 measures only.

TABLE 5.

Tribe.	No.	Stature.						Span.						Index.			
		M.	EM.	σ.	Eσ.	C.	EC.	M.	EM.	σ.	Eσ.	C.	EC.	M.	EM.	σ.	Eσ.
1. Kafir	18	166·78	·90	6·33	·64	3·8	·4	170·78	1·00	7·00	·71	4·1	·4	102·56	·34	2·27	·24
2. Chitrali ...	22	168·45	·81	5·93	·58	3·5	·3	171·50	·90	7·17	·64	4·2	·4	101·82	·31	2·33	·22
3. Mastuji ...	28	166·61	·72	7·04	·51	4·2	·3	169·93	·80	7·29	·57	4·3	·3	102·00	·27	3·66	·19
4. Sarikoli ...	40	163·77	·60	4·43	·43	2·7	·3	166·40	·67	6·25	·47	3·8	·3	101·55	·23	1·42	·16
5. Bagh-jigda ...	12	164·75	1·10	7·32	·78	4·4	·5	168·33	1·22	5·94	·86	3·5	·3	103·25	·42	2·44	·29
6. Pakhpo ...	25	160·40	·76	4·95	·54	3·1	·3	162·60	·85	5·05	·60	3·1	·4	101·32	·29	1·80	·20
7. Nissa	9	160·22	1·27	4·95	·90	3·1	·5	159·56	1·41	5·43	1·00	3·4	·6	99·44	·48	1·47	·34
8. Kökyar ...	37	162·92	·63	5·89	·44	3·6	·3	166·30	·70	7·89	·49	4·8	·3	102·22	·24	2·35	·17
9. Karanghu-tagh	21	166·05	·83	5·29	·59	3·2	·4	166·10	·92	7·09	·65	4·3	·4	100·05	·31	2·04	·22
10. Korla	14	166·79	1·02	7·06	·72	4·2	·4	167·29	1·13	8·39	·80	5·0	·5	99·86	·39	2·40	·27
11. Wakhi	19	168·00	·88	6·18	·62	3·7	·4	170·16	·97	5·35	·69	3·1	·4	101·32	·33	1·87	·23
12. Turfan	72	166·26	·45	5·70	·32	3·4	·2	168·00	·50	6·58	·35	3·9	·2	100·99	·17	2·17	·12
13. Khotan ...	67	165·52	·46	5·55	·32	3·4	·2	167·81[1]	·68	6·59	·48	3·9	·3	101·05[1]	·25	2·47	·18
14. Hami	21	163·00	·83	4·95	·59	3·0	·4	164·57	·92	6·61	·65	4·0	·4	100·95	·31	2·11	·22
15. Charklik ...	12	167·83	1·10	7·46	·78	4·4	·5	170·75	1·22	8·69	·86	5·1	·5	101·83	·42	1·93	·29
16. Loplik	38	169·50	·62	7·03	·44	4·1	·3	170·89	·69	6·81	·49	4·0	·3	100·82	·23	1·28	·17
17. Chinese ...	20	166·70	·85	·17	·60	3·1	·4	166·95	·95	5·02	·67	3·0	·4	100·20	·32	2·21	·23
18. Keriya	21	161·25	·93	6·29	·65	3·9	·3	167·20[2]	1·07	3·54	·76	2·1	·4	99·40[2]	·59	1·96	·42
19. Niya	18	162·50	·90	5·04	·64	3·1	·4	164·94	1·00	5·61	·71	3·4	·4	101·50	·34	2·37	·24
20. Polu	31	164·42	·70	5·83	·49	3·5	·3	164·39	·77	6·15	·35	3·7	·3	99·87	·26	1·55	·19
21. Aksu	13	163·77	1·06	5·85	·75	3·6	·5	169·15	1·17	5·07	·83	3·0	·5	103·31	·40	2·18	·28
22. Faizabad ...	12	166·92	1·10	4·92	·78	3·0	·5	173·25	1·22	5·22	·86	3·0	·5	103·83	·42	2·29	·29
23. Kelpin	15	165·00	·98	4·46	·70	2·7	·4	171·47	1·09	5·14	·77	3·0	·5	104·07	·37	1·89	·26
24. Dolan	16	164·12	·95	4·61	·67	2·8	·4	170·20[3]	1·09	5·89	·77	3·5	·4	103·20[3]	·35	1·66	·26
25. Kirghiz ...	38	164·08	·62	6·46	·44	3·9	·3	170·34	·69	7·52	·49	4·4	·3	103·63	·23	2·40	·17

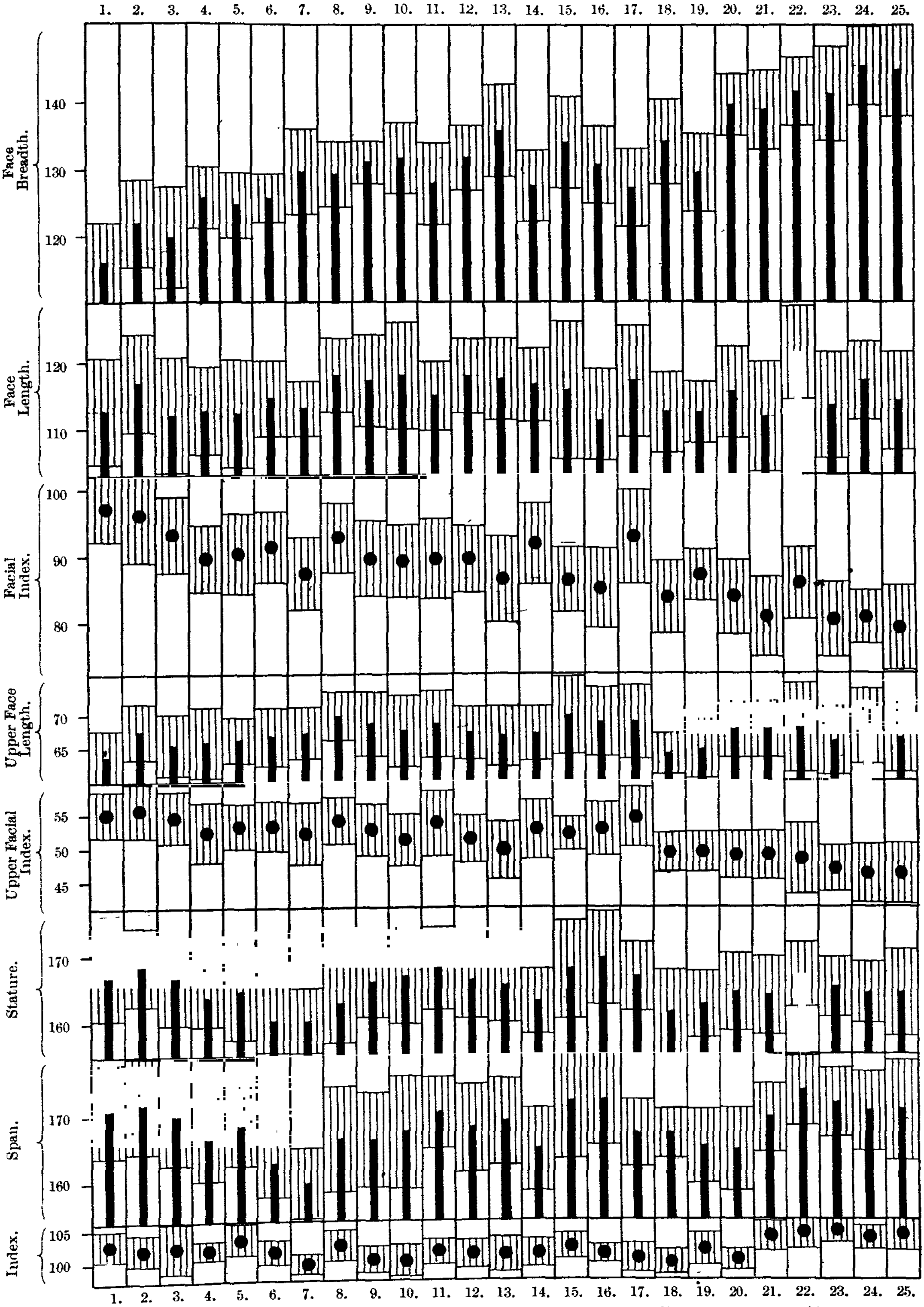
[1] 43 measures only. [2] 5 measures only. [3] 15 measures only.

TABLE 6.



1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25.
Head Length.
190
180
170
Head Breadth.
160
150
Cephalic Index.
90
80
Head circumference.
590
580
570
560
550
540
Nose Length.
55
50
45
Nose Breadth.
40
35
30
Nasal Index.
80
70
60
1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25.

TABLE 7.



1. Kafir.
2. Chitrali.
3. Mastuji.
4. Sarikoli.
5. Bagh-jigda.
6. Pakhpo.
7. Nissa.
8. Kökyar.
9. Karanghu-tagh.
10. Korla.
11. Wakhi.
12. Turfan.
13. Khotan.
14. Hami.
15. Charklik.
16. Loplik.
17. Chinese.
18. Keriya.
19. Niya.
20. Polu.
21. Aksu.
22. Faizabad.
23. Kelpin.
24. Dolan.
25. Kirghiz.

TABLE 8.

	Kafir.	Chitrali.	Mastuji.	Sarikoli.	Bagh-jigda.	Pakhpo.	Nissa.	Kökyar.	Karanghu-tagh.	Korla.	Wakhi.	Turfan.	Khotan.	Hami.	Charklik.	Loplik.	Chinese.	Keriya.	Niya.	Polu.	Aksu.	Faizabad.	Kelpin.	Dolan.
Chitrali ...	5·92	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mastuji ...	4·18	4·84	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sarikoli ...	7·91	6·75	4·71	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bagh-jigda ...	6·48	8·44	5·94	3·66	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pakhpo ...	9·42	8·11	6·27	4·10	4·78	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nissa ...	10·49	11·73	7·31	6·70	9·13	5·36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kökyar ..	11·82	8·21	8·03	5·63	8·28	6·58	9·27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Karanghu-tagh	8·72	7·13	7·43	6·93	8·51	5·47	4·61	6·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Korla	12·55	10·99	8·67	7·19	8·86	8·52	8·48	6·76	7·02	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wakhi ..	8·99	6·76	5·76	6·31	7·62	6·39	8·57	5·00	5·51	4·50	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Turfan ...	9·98	10·11	6·61	5·93	6·90	7·45	8·30	6·28	6·14	2·03	3·94	—	—	—	—	—	—	—	—	—	—	—	—	—
Khotan ...	12·39	9·19	8·47	5·80	7·28	6·96	7·32	4·91	5·77	4·62	4·80	2·98	—	—	—	—	—	—	—	—	—	—	—	—
Hami	9·34	8·68	6·34	5·46	6·98	4·55	5·68	6·04	4·93	4·61	5·57	4·71	6·62	—	—	—	—	—	—	—	—	—	—	—
Charklik .	9·79	8·69	7·08	6·12	7·54	8·30	7·89	7·95	6·33	5·97	5·82	5·71	5·78	4·92	—	—	—	—	—	—	—	—	—	—
Loplik .	8·71	8·97	6·59	8·42	7·52	10·30	7·01	10·69	5·54	9·27	7·72	7·92	8·21	6·96	4·30	—	—	—	—	—	—	—	—	—
Chinese	6·32	8·17	6·47	8·22	6·44	7·64	8·44	9·91	4·84	10·66	8·63	9·30	9·90	6·73	6·77	5·20	—	—	—	—	—	—	—	—
Keriya ..	12·85	14·88	10·55	8·55	8·67	9·77	8·59	8·67	9·43	6·31	7·21	5·48	5·72	8·42	8·28	10·54	11·73	—	—	—	—	—	—	—
Niya	13·67	13·50	10·02	6·63	7·80	9·06	9·71	6·88	9·82	6·92	8·22	5·85	6·04	7·90	8·11	9·09	12·34	3·64	—	—	—	—	—	—
Polu .. .	11·97	9·92	8·44	6·71	8·55	5·87	5·79	8·12	7·15	6·76	6·50	6·28	4·06	6·77	7·53	8·24	9·29	7·10	8·30	—	—	—	—	—
Aksu	13·95	12·11	11·77	9·29	10·65	11·76	11·88	8·05	10·50	8·42	7·82	7·66	6·20	10·50	9·25	12·00	15·25	6·84	6·35	6·46	—	—	—	—
Faizabad . .	14·58	11·03	11·62	9·89	11·83	12·19	13·19	8·95	10·57	7·96	7·53	7·24	6·59	11·48	8·24	11·32	13·30	10·07	10·09	7·32	6·73	—	—	—
Kelpin ..	14·65	13·81	11·64	10·12	10·68	12·60	13·18	10·15	11·63	7·40	8·71	6·89	6·51	10·22	8·16	10·76	14·60	6·82	13·18	7·68	5·05	7·16	—	—
Dolan	16·28	13·24	11·62	11·82	12·00	13·17	13·11	9·52	10·91	7·15	8·86	7·44	7·77	10·62	8·04	11·16	14·24	9·01	9·99	7·83	5·57	6·99	3·41	—
Kirghiz ...	15·72	15·22	12·39	11·34	12·39	13·42	14·81	11·94	13·39	8·49	9·89	8·72	9·13	10·89	8·93	12·08	15·46	8·75	9·76	10·80	6·20	8·80	2·84	3·35

TABLE 9.

Tribe.	ΣΔ under 3.	ΣΔ under 4.	ΣΔ under 5.	ΣΔ under 6.
Kafir			Mastuji	*Chitrali.*
Chitrali			Mastuji	*Kafir.*
Mastuji			Kafir, Chitrali, Sarikoli	Wakhi, Bagh-jigda.
Sarikoli		Bagh-jigda	Mastuji, Pakhpo	Turfan, Kökyar, *Khotan*, *Hami.*
Bagh-jigda		Sarikoli	Pakhpo	Mastuji.
Pakhpo			Sarikoli, Bagh-jigda, Hami	*Karanghu-tagh*, *Nissa*, *Polu.*
Nissa			Karanghu-tagh	Hami, *Pakhpo*, *Polu.*
Kökyar			Khotan	Sarikoli, Wakhi.
Karanghu-tagh			Nissa, Hami, *Chinese*	Loplik, *Pakhpo*, *Wakhi*, *Khotan.*
Korla	Turfan		Wakhi, Khotan, Hami	Charklik.
Wakhi		Turfan	Khotan, Korla	Mastuji, Charklik, Hami. Kökyar, *Karanghu-tagh.*
Turfan	Khotan, Korla	Wakhi	Hami	Sarikoli, Charklik, Keriya, *Niya.*
Khotan	Turfan		Wakhi, Polu, Kökyar, Korla	Charklik, Keriya, *Sarikoli*, *Karanghu-tagh.*
Hami			Pakhpo, Karanghu-tagh Turfan, Charklik, Korla	Nissa, Wakhi, *Sarikoli.*
Charklik			Loplik, Hami	Wakhi, Turfan, Khotan, Korla.
Loplik			Charklik	Karanghu-tagh, Chinese.
Chinese			*Karanghu-tagh*	Loplik.
Keriya		Niya		Turfan, Khotan.
Niya		Keriya		*Turfan.*
Polu			Khotan	*Pakhpo*, *Nissa.*
Aksu				Kelpin, Dolan.
Faizabad				
Kelpin	Kirghiz	Dolan		Aksu.
Dolan		Kelpin, Kirghiz		Aksu.
Kirghiz	Kelpin	Dolan		

TABLE 10.

Tribe.	ΣΔ over 15.	ΣΔ over 14.	ΣΔ over 13.	ΣΔ over 12.	ΣΔ over 11.	ΣΔ over 10.	ΣΔ over 9.
Kafir	Dolan, Kirghiz.	Faizabad, Kelpin.	Niya, Aksu ...	Khotan, Keriya, Korla.	Polu, Kökyar ...	Nissa	Pakhpo, Turfan, Charklik, Hami.
Chitrali ...	Kirghiz	Keriya	Niya, Kelpin, Dolan.	Aksu	Nissa, Faizabad.	Turfan, Korla ...	Polu, Khotan.
Mastuji ...	... ...	... ...	... ...	Kirghiz	Faizabad, Aksu, Kelpin, Dolan.	Niya, Keriya ...	... ...
Sarikoli ...	... ...	... ...	... ...	... ...	Kirghiz, Dolan ...	Kelpin	Faizabad, Aksu.
Bagh-jigda ...	... ...	... ...	... ...	Kirghiz, Dolan	Faizabad ...	Aksu, Kelpin ...	Nissa.
Pakhpo ...	... ...	... ...	Kirghiz, Dolan	Faizabad, Kelpin.	Aksu	Loplik	Kafir, Keriya, Niya.
Nissa	... ...	Kirghiz	Faizabad, Kelpin, Dolan.	... ...	Chitrali, Aksu ...	Kafir	Bagh-jigda, Kökyar, Niya.
Kökyar ...	... ...	... ...	... ...	... ...	Kafir, Kirghiz ...	Loplik, Kelpin ...	Chinese, Nissa, Dolan.
Karanghu-tagh	... ...	... ...	Kirghiz	... ...	Kelpin	Faizabad, Aksu, Dolan.	Keriya, Niya.
Korla	... ...	... ...	... ...	Kafir	... ...	Chitrali, Chinese ...	Loplik.
Wakhi... ...	... ...	... ...	... ...	... ...	... ...	... ...	Kirghiz.
Turfan ...	... ...	... ...	... ...	... ...	... ...	Chitrali	Kafir, Chinese.
Khotan ...	... ...	... ...	... ...	Kafir	... ...	... ...	Chitrali, Chinese, Kirghiz.
Hami	... ...	... ...	... ...	... ...	Faizabad ...	Aksu, Kirghiz, Kelpin, Dolan.	Kafir.

TABLE 10—*Continued.*

Tribe.	ΣΔ over 15.	ΣΔ over 14.	ΣΔ over 13.	ΣΔ over 12.	ΣΔ over 11.	ΣΔ over 10.	ΣΔ over 9.
Charklik ...	... ...	... ...	... ...	... ...	... ...	... ...	Kafir, Aksu.
Loplik... ...	... ...	... ...	... ...	Aksu, Kirghiz ...	Faizabad, Dolan.	Pakhpo, Kökyar, Kelpin, Keriya.	Korla, Niya.
Chinese ...	Kirghiz, Aksu ...	Kelpin, Dolan ...	Faizabad ...	Niya	Keriya	Korla	Turfan, Polu, Khotan, Kökyar.
Keriya ...	... ...	Chitrali	... ...	Kafir	Chinese	Mastuji, Loplik, Faizabad.	Karanghu - tagh, Dolan, Pakhpo.
Niya	... ...	... ...	Kafir, Chitrali ...	Chinese	... ...	Mastuji, Faizabad.	Pakhpo, Loplik, Kirghiz, Nissa, Karanghu - tagh, Dolan.
Polu	... ...	... ...	... ...	... ...	Kafir	Kirghiz	Chitrali, Chinese.
Aksu	Chinese	... ...	Kafir	Chitrali, Loplik.	Mastuji, Pakhpo, Nissa.	Karanghu - tagh, Bagh-jigda, Hami.	Sarikoli, Charklik.
Faizabad ...	... ...	Kafir	Chinese, Nissa ...	Pakhpo	Chitrali, Bagh-jigda, Mastuji, Loplik, Hami.	Karanghu - tagh, Niya, Keriya.	Sarikoli.
Kelpin ...	... ...	Kafir, Chinese ...	Chitrali, Nissa ...	Pakhpo	Mastuji, Karanghu-tagh.	Sarikoli, Bagh-jigda, Loplik, Hami, Kökyar.	... ...
Dolan	Kafir	Chinese	Chitrali, Pakhpo, Nissa.	Bagh-jigda ...	Sarikoli, Mastuji, Loplik.	Karanghu - tagh, Hami.	Kökyar, Niya, Kariya.
Kirghiz ...	Kafir, Chitrali, Chinese.	Nissa	Pakhpo, Karanghu-tagh.	Mastuji, Loplik, Bagh-jigda.	Sarikoli, Kökyar.	Polu, Hami ...	Wakhi, Khotan, Niya.

TABLE 11.

	Skin-colour. Per cent.					
	Brown.	Rosy-Brown.	Rosy.	Rosy-Yellow.	Yellow.	Brown-Yellow.
Kafir	22	—	78	—	—	—
Chitrali	—	—	100	—	—	—
Mastuji	4	—	93	—	—	4
Sarikoli	—	—	100	—	—	—
Bagh-jigda ...	—	—	100	—	—	—
Pakhpo	—	—	100	—	—	—
Nissa	—	—	100	—	—	—
Kökyar	—	8	92	—	—	—
Karanghu-tagh ...	8	—	92	—	—	—
Korla	—	23	54	15	8	—
Wakhi	—	—	95	—	—	5
Turfan	—	14	73	11	2	—
Khotan	—	3	94	3	—	—
Hami	—	13	80	7	—	—
Charklik	—	—	100	—	—	—
Loplik	—	—	97	3	—	—
Chinese	—	—	35	—	65	—
Keriya	—	5	95	—	—	—
Niya	—	—	100	—	—	—
Polu	—	23	74	3	—	—
Aksu	—	23	62	15	—	—
Faizabad	—	25	75	—	—	—
Kelpin	—	26	67	7	—	—
Dolan	—	75	25	—	—	—
Kirghiz	—	42	58	—	—	—

TABLE 12.

	Hair-colour. Per cent.			Hair-quality. Per cent.			Hair-amount. Per cent.	
	Black.	Dark-Brown.	Fair and Medium.	Straight.	Wavy.	Curly.	Abundant, Moderate.	Scanty, Nil.
Kafir	17	56	28	28	—	72	100	—
Chitrali ...	5	91	5	—	—	100	100	—
Mastuji ...	14	82	4	—	—	100	100	—
Sarikoli ...	18	53	30	—	—	100	100	—
Bagh-jigda ...	25	75	—	—	—	100	100	—
Pakhpo ...	—	68	32	—	—	100	92	8
Nissa	44	33	22	—	—	100	100	—
Kökyar ...	35	38	26	—	—	100	69	31
Karanghu-tagh	—	69	31	—	—	100	100	—
Korla	46	46	8	—	—	100	77	23
Wakhi	5	63	32	—	—	100	100	—
Turfan	25	70	5	—	—	100	46	54
Khotan... ...	24	56	20	2	—	98	94	6
Hami	20	73	7	—	—	100	53	47
Charklik ...	27	73	—	—	—	100	33	67
Loplik	40	34	26	—	—	100	37	63
Chinese ...	75	20	5	95	—	5	30	70
Keriya	33	57	10	—	10	90	62	38
Niya	12	41	47	—	—	100	94	6
Polu	32	55	13	—	—	100	81	19
Aksu	31	54	16	—	100	—	54	46
Faizabad ...	10	72	19	—	83	17	92	8
Kelpin	47	40	13	—	100	—	86	14
Dolan	44	44	13	—	100	—	75	25
Kirghiz ...	50	47	3	—	100	—	29	71

TABLE 13.

	Eyes. Per cent.				
	Dark.	Medium.	Light.	Fold.	Fold (trace).
Kafir	11	61	28	—	—
Chitrali	—	91	9	—	—
Mastuji	14	79	7	—	—
Sarikoli	3	70	28	—	—
Bagh-jigda	—	92	8	—	—
Pakhpo	4	68	28	—	—
Nissa	78	11	11	—	—
Kökyar	34	60	6	—	—
Karanghu-tagh	23	69	8	—	—
Korla	62	38	—	15	—
Wakhi	5	89	5	—	—
Turfan	67	28	5	19	—
Khotan	44	49	7	—	—
Hami	67	33	—	—	7
Charklik	50	50	—	—	—
Loplik	16	79	5	5	5
Chinese	45	40	15	44	—
Keriya	29	57	14	—	5
Niya	18	53	30	—	—
Polu...	68	32	—	—	—
Aksu	77	23	—	—	—
Faizabad	33	58	8	—	—
Kelpin	40	47	14	—	—
Dolan	44	56	—	—	—
Kirghiz	43	55	3	*	—

* 37 per cent. of the Kirghiz are described as having "Mongolian eyes."

TABLE 14.

Tribe.	No.	HL	σ	HB	σ	CI	σ	NL	σ	NB	σ	NI	σ	St	σ
Galcha ...	58	185	6·34	158	5·99	86	4·11	52	3·69	—	—	—	—	167	5·77
Pathan	80	185	6·75	142	4·12	76	3·20	50	2·80	34	1·87	68	5·17	169	6·04
Biloch ...	60	179	7·36	144	4·67	80	4·51	49	2·73	34	2·25	69	4·85	166	5·05
Dard ...	44	190	6·77	145	5·14	75	3·00	53	3·56	34	3·31	64	7·05	164	8·08
Ladakhi	31	194	4·26	148	4·74	77	2·99	49	3·31	37	4·10	76	11·43	163	4·57
Tibetans	38	189	6·25	153	5·92	80	3·75	52	3·82	39	2·90	75	8·06	164	6·22

TABLE 15.

	Galcha.*	Pathan.	Biloch.	Dard.	Ladakhi.	Tibetans.
Kafir	*4·97*	3·19	*3·61*	*3·10*	2·71	*4·78*
Chitrali	*2·31*	*3·56*	3·63	2·91	*4·86*	*3·67*
Mastuji	*3·07*	*3·60*	2·40	*3·97*	*3·63*	*3·53*
Sarikoli	2·95	*3·85*	2·23	*4·36*	*4·31*	*3·68*
Bagh-jigda	*4·50*	*4·27*	*3·25*	*5·34*	*3·70*	*3·99*
Pakhpo	*4·18*	*5·26*	3·80	*4·66*	2·69	2·76
Nissa	*4·87*	*4·68*	*4·88*	*3·46*	2·17	2·28
Kökyar	2·12	*6·24*	*4·33*	*6·17*	*5·00*	*3·24*
Karanghu-tagh	*3·55*	*3·86*	*3·76*	2·90	1·65	2·38
Korla	0·79	*7·23*	*6·43*	*8·55*	*6·38*	*4·02*
Wakhi	0·98	*4·76*	*4·37*	*5·88*	*5·74*	*3·78*
Turfan	*2·71*	*6·91*	*5·19*	*7·35*	*5·14*	*4·02*
Khotan	1·71	*5·55*	*4·20*	*7·07*	*4·19*	2·48
Hami	3·13	*6·74*	*5·84*	*6·03*	*3·11*	2·37
Charklik	2·66	*5·78*	*4·93*	*6·04*	3·09	2·10
Loplik	*3·14*	*4·59*	*4·88*	*4·90*	2·27	*3·68*
Chinese	*5·91*	*3·77*	*4·49*	*4·01*	2·44	*4·67*
Keriya	*2·74*	*8·54*	*6·35*	*8·90*	*5·62*	*4·78*
Niya	*3·58*	*9·19*	*6·35*	*9·11*	*6·44*	*5·76*
Polu	*2·54*	*3·82*	3·02	*4·01*	2·77	2·02
Aksu	*2·58*	*7·34*	*5·11*	*6·72*	*6·94*	*4·42*
Faizabad	1·26	*5·85*	*4·75*	*5·40*	*6·24*	4·09
Kelpin	1·77	*7·98*	*5·38*	*8·19*	*5·57*	*3·58*
Dolan	1·83	*7·64*	*6·33*	*7·02*	*5·13*	3·74
Kirghiz	2·11	*8·77*	*6·54*	*8·90*	*6·48*	*4·63*
Pathan	*4·94*	—	1·87	1·87	*4·59*	*5·15*
Biloch	*4·24*	1·87	—	*3·70*	*4·45*	*3·57*
Dard	*4·68*	1·87	*3·70*	—	3·61	*4·37*
Ladakhi	*5·20*	*4·59*	*4·45*	3·61	—	3·05
Tibetans	*2·44*	*5·15*	*3·57*	*4·37*	3·05	—

* ΣΔ compiled from 6Δ only

TABLE 16.

Tribe.	ΣΔ under 1.	ΣΔ under 1·50.	ΣΔ under 2.	ΣΔ under 2·50.
Galcha	Korla, Wakhi ...	Faizabad, Dolan ...	Khotan, Kelpin...	Kökyar, Kirghiz, *Chitrali*, *Tibetans.*

Tribe.	Over 5·50.	Over 5.	Over 4·50.
Galcha	Chinese	Ladakhi	Kafir, Bagh-jigda, Nissa, Dard, Pathan.

TABLE 17.

Tribe.	ΣΔ under 2.	ΣΔ 2·50 and under.	ΣΔ 3 and under.	ΣΔ 3·50 and under.
Pathan	Biloch, Dard ...	... ...	... ...	Kafir.
Biloch	Pathan	Sarikoli, Mastuji ...	... ...	Polu, *Bagh-jigda.*
Dard	Pathan ...	... ...	Chitrali, Karanghu-tagh.	*Kafir, Nissa.*
Ladakhi	Karanghu-tagh	Loplik, Chinese, Nissa.	Kafir, Polu, Pakhpo.	Charklik, Tibetans, *Hami.*
Tibetans	... ...	Karanghu-tagh, Charklik, Polu, Hami, Khotan, Nissa.	Pakhpo	Ladakhi, *Kökyar.*

TABLE 18.

Tribe.	ΣΔ over 9.	ΣΔ 8 and over.	ΣΔ 7 and over.	ΣΔ 6 and over.
Pathan	Niya	Keriya, Kirghiz ...	Kelpin, Aksu, Dolan, Korla.	
Biloch	... ...	... ...	... ...	Kirghiz, Keriya, Korla, Niya, Dolan.
Dard	Niya	Korla, Kirghiz, Keriya, Kelpin.	Turfan, Dolan, Khotan.	Aksu, Charklik, Hami, Kökyar.
Ladakhi	... ...	... ...	... ...	Aksu, Korla, Kirghiz, Faizabad, Niya.
Tibetans	... ...	... ...	... ...	(Niya 5·76.)

FIG. 1.—KAFIRS AT BASHGAH.

FIG. 2.—CHITRALI.

PHYSICAL ANTHROPOLOGY OF CHINESE TURKESTAN AND THE PAMIRS.

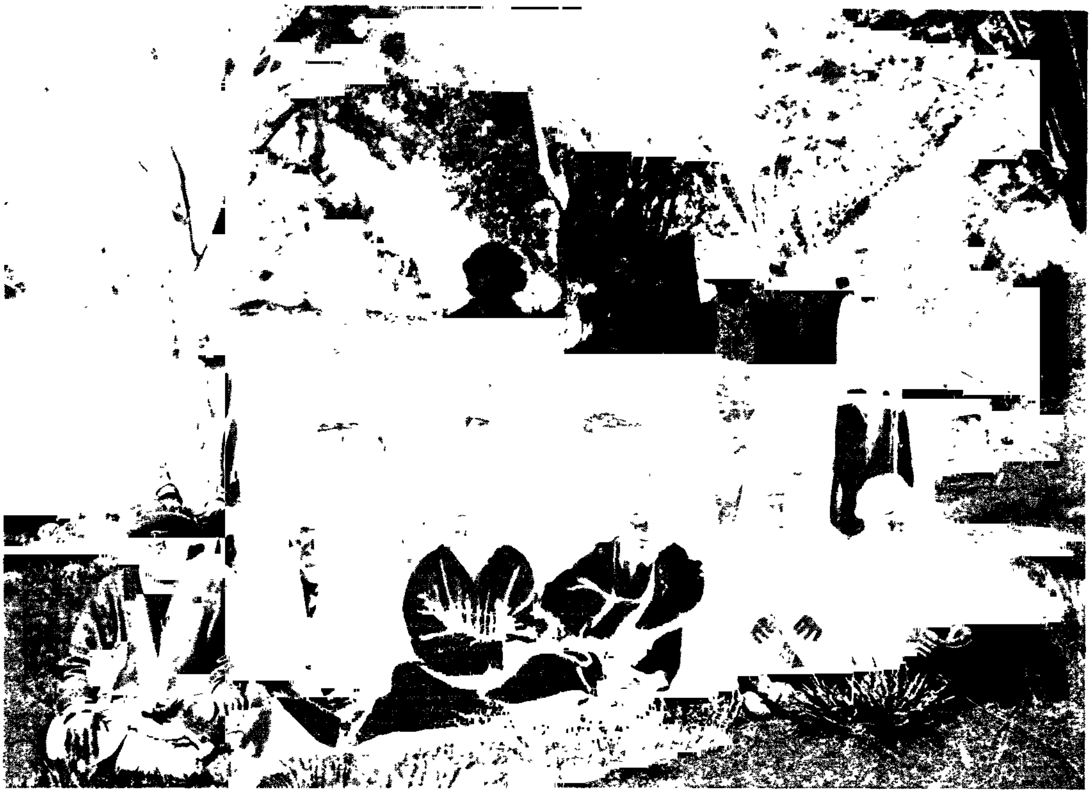


FIG. 1.—MASTUJI.

FIG. 2.—WAKHI AT BOZAI GOMBAZ.

PHYSICAL ANTHROPOLOGY OF CHINESE TURKESTAN AND THE PAMIRS.

FIG. 1.—PAKHPO.

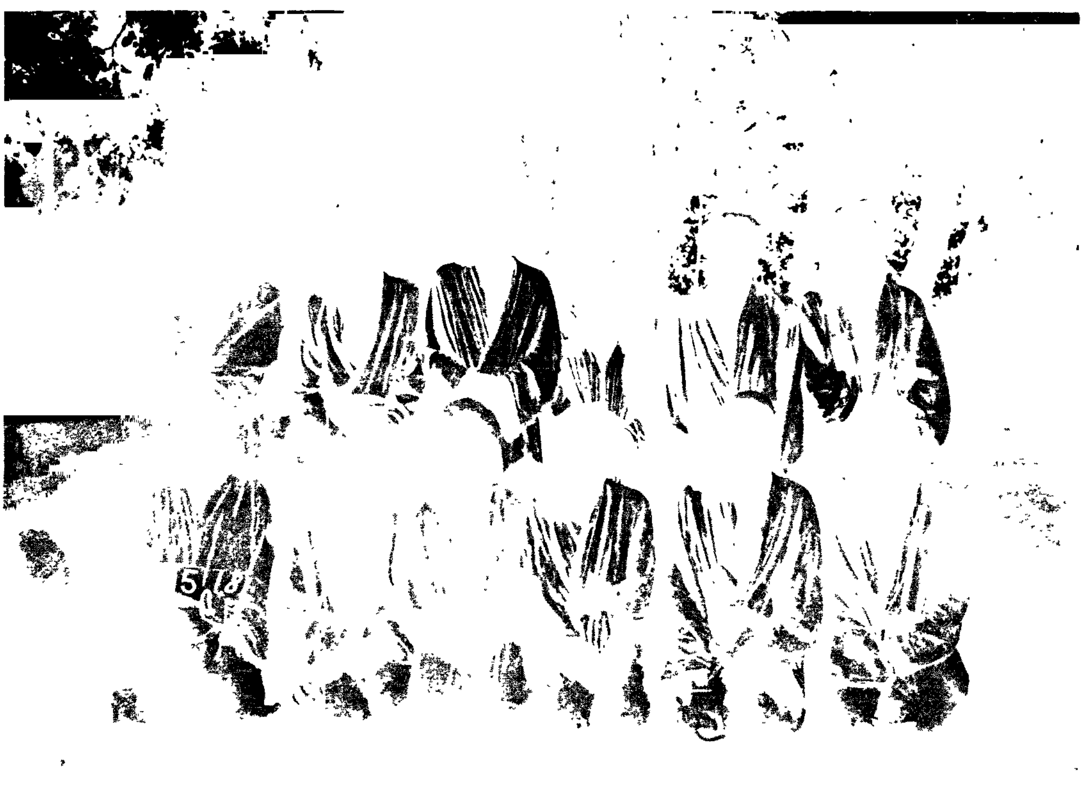


FIG. 2.—INHABITANTS OF YOTKAN (A SUBURB OF KHOTAN).

PHYSICAL ANTHROPOLOGY OF CHINESE TURKESTAN AND THE PAMIRS.

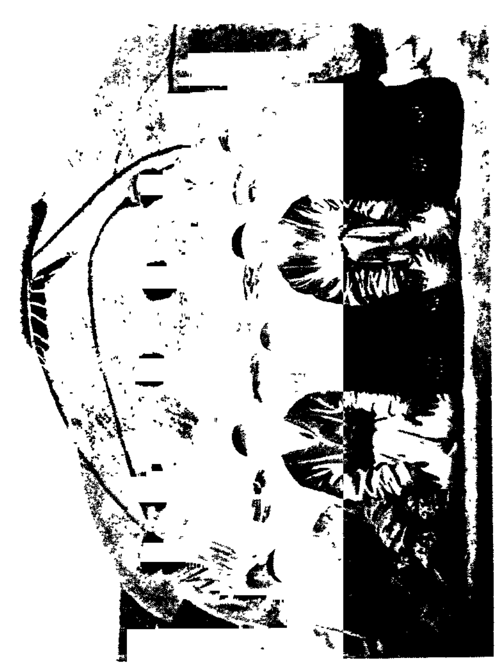


FIG. 1.—SARIKOLI OF TASHKURGAN.

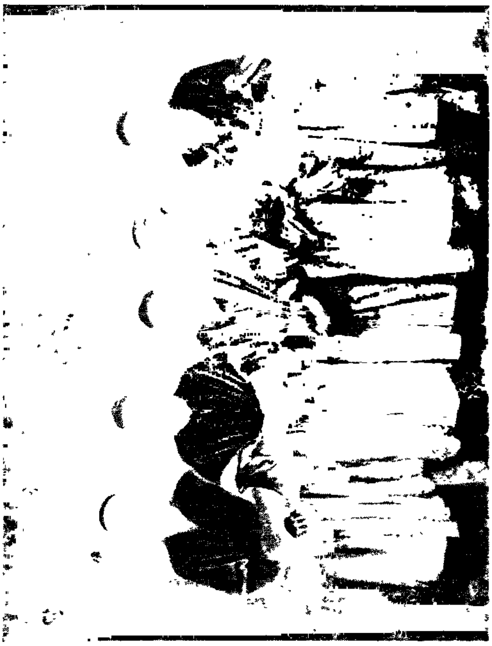


FIG. 2.—INHABITANTS OF KÖKYAR.

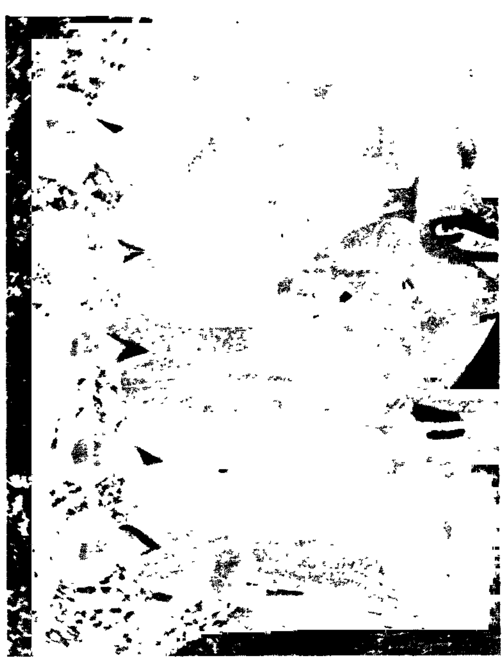


FIG. 3.—KIRGHIZ FROM SARBEL AT KELPIN.

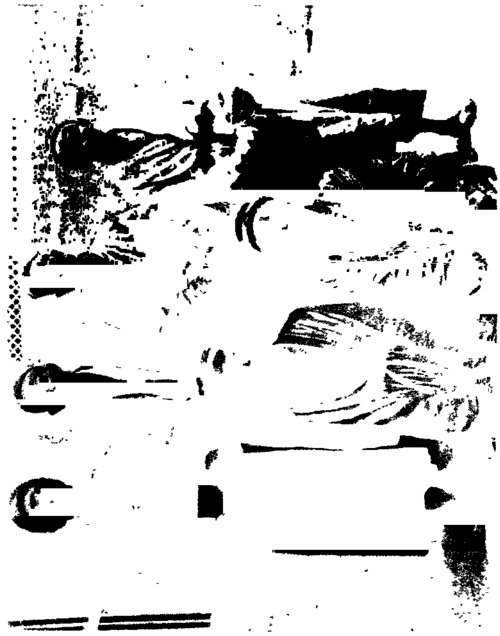


FIG. 4.—INHABITANTS OF AKSU.

PHYSICAL ANTHROPOLOGY OF CHINESE TURKESTAN AND THE PAMIRS.

FIG. 1.—INHABITANTS OF NIYA.

FIG. 2.—LOPLIK AT ABDAL.

PHYSICAL ANTHROPOLOGY OF CHINESE TURKESTAN AND THE PAMIRS.

ON THE PHYSICAL ANTHROPOLOGY OF THE FÆROE ISLANDERS.

BY SØREN HANSEN, M.D., Director of the Danish Anthropological Survey, Copenhagen.

ACCORDING to reliable, historical evidence the population of the Færoe Islands is, as a whole, to be regarded as the descendants of Norwegian settlers, who took possession of the islands in the ninth century A.D. Before this time, it is told, some Scotch hermits had dwelt there for about a hundred years, but they left the islands, being afraid of the Norse Vikings. Some of the first settlers may have come from the Hebrides or from Shetland, but as these islands were also peopled from Norway, it was altogether the same stock. Some Danish, Frisian, or English immigrants may have added later a small foreign element, but the population as a whole is of pure Norwegian descent.

The population of Norway in the Middle Ages was, however, by no means a pure stock. The so-called Viking type was only one of many different types composing the Norwegian people in those times as nowadays. The great extension of the coast-line, the deep fjords and narrow valleys have always facilitated the formation of small communities, different in mental capacity as in bodily form, and such communities could not fail, when removed to small distant islands, to develop into distinct local types. No wonder, then, if the actual population of the Færoe Islands were still divided into several distinct groups, different in stature, head form, colour of hair and eyes, and last but not least different in mental faculties. The inhabitants of the northern islands are really said to be slow and dull, while those of the southern are quick and active. As for the bodily form, the northern group has been described as tall, long-skulled, and rather dark-haired, the southern as short, round-skulled, and fair.

Although our knowledge of the physical anthropology of the Færoe Islanders has hitherto been very meagre, the American anthropologist, Mr. Ripley, the eminent author of *The Races of Europe*, has not hesitated in taking it for granted that the aforesaid difference between the northern and southern group is a reliable fact. Mr. Ripley says that there is a strong representation of the Alpine type in the Færoe Islanders at the present time, and supposes that the Round Barrow people are responsible for it. Now, the Alpine type is to be found everywhere more or less frequently, but it is not permissible to speak of a strong representation of this type or another unless a considerable portion of the population of the country in question really belongs to the type in all principal features. This is not the case in the Færoe Islands, and still more erroneous is it to speak of the famous Round Barrow people as the ancestors of the supposed Alpine Færoe Islanders. The typical Round Barrow skull, well known from the classic descriptions of Davis and

Thurnam, of Rolleston, Huxley, and many other eminent English anthropologists, is not Alpine. Both these types are brachycephalic, but the difference between the Round Barrow skull and the true Alpine skull is obvious, and they ought not to be confounded. Probably the Round Barrow type as well as the Alpine type is really represented among the Færoe Islanders as among the Danes and the Norwegians, but we know nothing about it. We only know that the population of these islands, as well as that of Denmark and Norway, contains a certain number of brachycephalous individuals.

The whole question is highly important for understanding the relation of the various human types of Northern Europe to one another. The definite solution of the question has hitherto been impossible, because the available materials were too small. In recent years, however, we have obtained a considerable amount of new and valuable measurements, which enable us to take up the study of the Færoe Islanders in a most efficient manner. A Danish physician, the late Mr. Jørgensen, some years ago published a complete series of measurements of 2,000 individuals, male and female, of all ages. Mr. Jørgenson was not himself an anthropologist, and his publication of the results obtained does not satisfy the demands of science. The great value of the rough material, however, has induced the Danish Anthropological Committee to treat it in an elaborate manner and bring together some of the results.

All the individuals belong to the southern group. About half are children, and there are only 493 adult males and 495 adult females over twenty years old. This number is, notwithstanding, quite sufficient for the study of the bodily form and condition, and the following statements may be regarded as wholly reliable.

The average stature of the 493 males (adults) was 169·12 cm. and that of the 495 females (adults) was 158·38 cm. The following table shows the distribution of the individuals in height classes:—

Cm.	Men.	Women.
140–145	—	9
145–150	—	23
150–155	4	78
155–160	22	182
160–165	86	138
165–170	147	57
170–175	145	8
175–180	74	—
180–185	15	—

The average deviation from the mean stature was in the men 4·58 cm., in the women 4·45 cm., or respectively 2·7 per cent. and 2·8 per cent. of the average stature, or almost precisely the same as in 3,000 adult Danes measured by the Danish Anthropological Committee.

These figures differ sensibly from those hitherto published, the principal foundation for the aforesaid theory of the strong representation of the Alpine type in the Færoe Islanders. According to Arbo, the late Norwegian anthropologist, cited among others by Mr. Deniker, the average stature of the southern Færoe Islanders is only 165·2 cm. in men and 158·5 cm. in women. In order to reconcile these two very different statements bearing on the male stature, I have revised the computation of Arbo and found it erroneous. His material consisted of certain measurements made some thirty to forty years ago by several Danish medical men and published in 1889 by one of them, Mr. A. Berg, now retired in Hørsholm, Denmark. The publication of Mr. Berg contains two series, one measured by Mr. Berg himself and comprising 112 men, and another measured by Mr. Lund and comprising 20 men. The average stature of the first of these series is really as stated by Arbo 165·10 cm., but the series contains thirteen not full-grown men from sixteen to nineteen years old. When these are taken away, the average stature of the remaining ninety-nine full-grown men rises to 168·17 cm., or only one centimetre below that computed from the measurements of Mr. Jørgensen. The series of Mr. Lund has been erroneously computed, the real average of his twenty men being 170·45 cm., or 1·33 cm. more than the average of Mr. Jørgensen, which after all may be said to be the exact figure.

In the same way the average stature of the women has been found to be nearly the same in all three series. The slight and doubtful difference remaining may be due to the general increase of stature that has taken place in most European populations in the last decennaries.

It is more difficult to account for the difference in head form thirty years ago and now. According to Arbo the average cephalic index in the southern Færoe Islanders was 83·15 and 83·61 respectively for twenty men and twenty women, or more than three units over the averages computed from the numerous measurements of Jørgensen. Such a change of head form in thirty years is hardly credible, and as the computation is not here erroneous I am inclined to believe that the measurements used by Arbo were made in a manner different from the usual. The measurements of Jørgensen were carried out according to the directions of Arbo and myself, and are undoubtedly trustworthy.

Whatever may have been the case thirty years ago, the present population of the southern Færoe Islands is certainly not brachycephalic, nor does it contain a strong representation of any brachycephalic type. The following table shows the variation :—

Cephalic Index.	Men.	Women.
70–71	—	3
71–72	2	2
72–73	4	1
73–74	8	4
74–75	20	9
75–76	29	12
76–77	42	27
77–78	43	41
78–79	64	50
79–80	61	61
80–81	60	76
81–82	53	70
82–83	36	49
83–84	30	23
84–85	16	28
85–86	9	24
86–87	7	8
87–88	4	5
88–89	2	—
89–90	1	2
90–91	1	—
91–92	—	—
92–93	1	—

If a foreign Alpine element existed in the population we might expect to find a close correlation between the stature, the cephalic index, and other characteristic features of the true Alpine type. We might especially have expected to find the increasing stature corresponding to the decreasing cephalic index. The following table will show that the cephalic index of tall people does not differ sensibly from that of the small:—

Stature.	Cephalic Index.	
Cm.	Men.	Women.
140–145	—	81·35
145–150	—	80·48
150–155	77·87	80·65
155–160	80·47	80·55
160–165	79·80	80·74
165–170	79·49	79·67
170–175	79·59	77·23
175–180	79·82	—
180–185	78·59	—

The very slight difference between the cephalic index of small and large individuals will be still more evident from the following table, in which each of the two sexes is divided into two groups, small and large:—

Number.		Group of Stature.	Average Stature.	Average Cephalic Index.
Men	259	150–170	164·36	79·67
	234	170–185	174·00	79·59
Women	292	140–160	154·22	80·60
	203	160–180	163·61	80·47

As a supplement to these tables we have computed the stature corresponding to each value of the increasing cephalic index in both sexes:—

Cephalic Index.	Stature.	
	Men.	Women.
	Cm.	Cm.
73 and less	170·64	161·80
74	167·60	158·78
75	170·08	161·63
76	168·38	158·43
77	169·23	158·60
78	170·13	158·72
79	169·57	158·07
80	169·78	158·42
81	167·83	158·27
82	168·82	157·77
83	168·85	157·39
84	168·69	157·46
85	172·22	157·85
86 and more	166·67	157·95

Dividing the whole material into a dolichocephalic and a brachycephalic group, we find that the average stature in either group of each sex is almost precisely the same, the difference amounting only to six and seven millimetres respectively.

Number.		Group of Index.	Average Index.	Average Stature.
Men	273	71–80	77·34	169·43
	220	80–92	82·46	168·83
Women	210	70–80	76·99	158·79
	285	80–89	82·52	158·09

There is nothing in these tables to indicate the existence of more than one single race or type in the population, and this race or type does not differ sensibly from the common Norse or Danish. No "Alpine," or "Celtic," or "Round Barrow"

element has left any visible trace in the tables, and the local type that may formerly have lived in the southern Færoe Islands must long ago have fallen back to the common type.

It is not my object to treat here all the physical characters of the Færoe Islanders. I would only add some remarks on the colour of the hair and eyes, because the dark colour has always been regarded as one of the principal characteristics of the true Alpine type. The comparison of the colour in different populations is not easy, but when we have to do with the same observer, as here, we may take *fair* as 1, *medium* as 2, *dark* as 3, and *black* as 4; then multiply the number of individuals in each group with these standards, add the products, and divide the sum with the whole number. We get in this way a "degree of pigmentation," rather arbitrary to be sure, but sufficiently exact for the purpose. This degree of pigmentation in the southern Færoe Islanders, computed from the observations of Jørgensen, is the following:—

	Men.	Women.
Hair	2·19	2·26
Eyes	1·86	1 96

If we take the small and large persons separately, we have the following table:—

	Men.		Women.	
	Hair.	Eyes.	Hair.	Eyes.
Small	2·22	1·87	2·27	1·95
Large	2·17	1·85	2·24	1·97

If, in the same way, we calculate the degree of pigmentation separately for dolichocephalic and brachycephalic men and women, we obtain this table:—

	Men.		Women.	
	Hair.	Eyes.	Hair.	Eyes.
Dolichocephalic ...	2·21	1·83	2·20	1·95
Brachycephalic ...	2·17	1·90	2·30	1·96

As appears from these tables, the difference between the groups is so small that there is practically speaking no difference at all. The population is completely homogeneous without any trace of foreign races.

In the paper cited by Mr. Ripley, Arbo suggests that the supposed Alpine element in the southern Færoe Islands may have come from Scotland or Ireland, or, in other words, that it may have been Celtic. This is not exactly the opinion of Mr. Ripley, who looks upon this Alpine " race " as a matter of fact. Mr. Ripley is inclined to believe that this race is responsible for the existence of brachycephalic individuals more or less numerous in the Færoe Islands at the present time, but he does not say anything about the way along which the race has reached these remote islands. Arbo did not believe in the Alpine race, Mr. Ripley does not believe in the Celtic race, and I for my part do not believe in the Round Barrow race. The only fact remaining is, in my opinion, that the population of the Færoe Islands contains various brachycephalic types, none of which represent distinct races. The brachycephalic individuals among the Færoe Islanders are nothing but individuals, which differ from all the dolichocephalic in this single feature, and differ from each other in various other features. The question of the supposed Alpine, or Celtic, or Round Barrow element is simply a question of natural variation within a homogenous population.

THE KAYAK IN NORTH-WESTERN EUROPE.

By David MacRitchie.

The word *kayak* is here taken in its common acceptation as denoting the long, narrow, skin-covered canoe of the Eskimo. This kind of canoe has other names; and, conversely, the word *kayak* (varying into *kayik* and *kayook*) is sometimes applied to vessels of a different description.[1] But it is convenient to employ the word in its commonest sense.

At the present day the kayak is in use over a great extent of the Arctic regions, from East Greenland westward across Arctic America, and along some 800 miles of the Asiatic coast, both westward and south-westward from Behring Straits.

In the sixteenth and seventeenth centuries it is reported at a point very much farther to the west, namely, on the coast of north-east Russia beside Vaigatz Island. Stephen Burrough, the English traveller, who visited that coast in 1556, has furnished us with an account of the natives, in the course of which he says: "Their boats are made of deer's skins, and when they come on shore they carry their boats with them upon their backs."[2] This statement would apply to existing Eskimo and their kayaks.[3] A century after Burrough, the same coast was visited by a Danish trading expedition sailing from Copenhagen. The French surgeon of the expedition, who has left a racy account of the voyage, describes how the ships' boats gave chase to a native of this locality whom they saw in his canoe, a mile and a half from the shore. "As soon as he saw us coming towards him," says the chronicler, "he rowed with such force that it was impossible for us to get near him. And on reaching the shore, he, with great swiftness and dexterity, lifted his

[1] The Turkish *kaik*, or *kayik* (Fr. *caïque*), is a wooden skiff. Then, again, there are references to *cayooks*, or *cayucks*, on the River Petchora, North Russia, in 1611, which were vessels of from four to seven tons. (See *Purchas his Pilgrimes*, Part III, lib. iii, pp. 534 and 540.) Canon Isaac Taylor states his belief (*Athenæum*, 26th July, 1879; *Academy*, 11th November, 1893) that the earliest assignable home of the word was the shores of Lake Baikal, before the great scission of the Turkic race "which took the Seljuks westward to the Bosphorus, and the Yakuts northward down the Lena to the shores of the Arctic Ocean." He regards it as probable that the Eskimos at the mouth of the Lena took this name with them in their migration across Behring's Straits to the shores of Greenland.

[2] Hakluyt, first edition, p. 318.

[3] Even the reference to deer-skin as a covering is still applicable, although seal-skin is more commonly used. The Hudson's Bay Eskimos employ deer-skin (Hanbury's *Sport and Travel in the Northland of Canada*, London, 1904, p. 3).

canoe upon his shoulder, and holding his bow and his spear in the other hand (his quiver being on his back), he sped away." When these two accounts are taken together it seems fairly evident that the skin kayak is denoted. But there is no doubt whatever in the following description of a canoe, containing a man and a woman, which the Danes captured the same day. "The canoe was made in the style of a gondola (*fait en gondolle*), being fifteen or sixteen feet long by two and a half feet broad, very cleverly constructed of fish ribs (probably baleen or whalebone) covered with fish skins (? seal skins) stitched together, thus making the canoe a purse, as it were, from one end to the other. Within it the two were enclosed up to the waist in such a manner that not a single drop of water could get into their little vessel, so that they were enabled to expose themselves to every tempest without any danger."[1]

A very peculiar interest attaches to this record of a two-holed kayak in European waters in the seventeenth century. The two-holed kayak appears to be quite unknown between East Greenland and Alaska, and it is specially associated with the Aleutian Isles. The earliest picture of a two-holed kayak, so far as I know, is that given by Captain Cook, and it belongs only to the latter part of the eighteenth century. That variety was seen by Captain Cook at Unalaska in the Aleutian Isles, and it seems to have been a novelty to him. Yet here we have a word-picture of a hundred years earlier, showing the two-holed kayak as in use at that date on the north-east coast of Russia. This variety of kayak, therefore, appears to belong to the Eurasian continent and to the Aleutian Isles; occasionally intruding itself in Alaska as a visitor from the west.

Mention may be made of the harpoon-points found in Lapland at Kjelmö, on the south side of the Varanger Fiord. "Some of these harpoon-points resemble old, primitive, Eskimo forms, which are found in Greenland," observes Dr. Nansen. He adds that they are remarkably small, and could not have been used for any animal larger than a seal. He further states that "Nothing has been found which might afford us information as to the kind of boats these northern sealers used."[2]

It would not be surprising if these boats were of the same description as the skin kayaks of the Archangel coast, but, on the other hand, they might have been wooden boats. Nevertheless, the existence of these harpoon-points on the south side of the Varanger Fiord, and their resemblance to old Eskimo forms, may be appropriately kept in view.

Contemporaneous with the kayaks of the North Russian coast are certain indubitable kayaks reported from Northern Scotland. One of these is the specimen preserved in Aberdeen. It is stated to have been captured near the Aberdeenshire coast, and it is now in the Anthropological Museum, Marischal College, Aberdeen. Its history is given by Francis Douglas, in his *General*

[1] These references to the canoes seen by the Danish expedition will be found in Martinière's *Voyage des Pais Septentrionaux*, Paris, 1671, pp. 150–3.

[2] *In Northern Mists*, London, 1911, pp. 215–6.

Description of the East Coast of Scotland (Paisley, 1782). At the time of Douglas's visit to Aberdeen the kayak was preserved in the library of Marischal College along with other curiosities, and he thus refers to it in giving a summary of the objects that specially attracted his attention: "A canoe taken at sea, with an Indian man in it, about the beginning of this century.[1] He was brought alive to Aberdeen, but died soon after his arrival, and could give no account of himself. He is supposed to have come from the Labrador coast, and to have lost his way at sea. The canoe is covered with fish skins, curiously stretched upon slight timbers very securely joined together. The upper part of it is about twenty inches broad at the centre, and runs off gradually to a point at both ends. Where broadest, there is a circular hole, just large enough for the man to sit in, round which there is a kind of girth, about a foot high, to which he fixed himself, probably when he did not use his oar or paddle, which, when he chose it, he stuck into some lists of skin tied round the canoe, but slack enough to let in the paddle and some other awkward utensils which were found stuck there. The canoe is about 18 feet long, and slopes on both sides, but the bottom is flat for 3 or 4 inches in the middle and gradually sharpens as it approaches the extremities till it ends in a point."

The general correctness of the measurements given by Douglas is confirmed by Professor Reid of Aberdeen University, who adds the information that the weight of the kayak is about thirty-four pounds. Professor Reid has favoured me with a very precise and detailed account of the kayak and the implements belonging to it, which, with his permission, is annexed hereto.

With regard to the circumstances attending the capture of this kayak it must be borne in mind that our first printed information is obtained from a man who visited Aberdeen some eighty years after the event. He states that it occurred "about the beginning of the century," which may be held to denote any date between 1690 and 1710. In the course of the eighty years the facts may have become partly forgotten. In stating that the captive "could give no account of himself," Douglas leaves us in doubt as to whether his language was not intelligible to his captors or whether he was then too weak to speak coherently. It is evident, at any rate, that Douglas regarded him as an Eskimo; because a so-called "Indian man" who is supposed to have come from Labrador in a kayak could have been no other than an Eskimo.

Further, the scene of the capture of the kayak and its occupant is not clearly indicated by Douglas. "Taken at sea" is vague enough. However, the unwritten belief which has been handed down with the canoe in Aberdeen is that the capture took place in the North Sea, not far from Aberdeen.

[1] It may be pointed that in the second edition of Douglas's book, published in 1826, no editorial notice is taken of the words "this century." Readers who are unaware that Douglas wrote the words about the year 1782, when his book first appeared, will naturally fall into the mistake of supposing that the period referred to is about the beginning of the nineteenth century.

The theory that the kayak-man had paddled across the Atlantic from Labrador to Scotland, a distance of 2,000 miles, is clearly untenable. For one thing, the voyage would have had to be intentionally undertaken. An Eskimo out fishing or sealing does not carry enough fresh water to last him for the three or four weeks which is the minimum time required to make the transatlantic voyage. Moreover, even if a strong westerly gale had driven him eastward for a day or two, he would have begun to paddle westward as soon as the storm abated. It is obvious that if the crossing was ever made it must have been by deliberate design. Enough fresh water to last a month must have been placed in the tiny hold, and also sufficient food for at least half the time; allowing that he could catch a certain amount of fish on the voyage. Moreover, the sea must have been calm nearly all the time. The voyager could not sleep, drink, eat, or satisfy any other natural want unless the sea was calm. When Eskimo intend spending a night or two at sea it is their custom to go in pairs, and at night they lash their kayaks together, thus giving them the stability of a raft. This admits of their sleeping with safety.[1] Presumably, in a calm sea, a solitary kayak-man can preserve his equilibrium when asleep. A calm sea is therefore necessary for sleep. It is necessary also for the performance of any of the other functions just indicated, which demand the untying of the lacing that unites the waterproof coat to the girth of the manhole. To untie this fastening when the deck was awash with water would be simple madness, resulting in immediate death by drowning. For these reasons the idea of a direct crossing from Labrador to Scotland cannot be permanently entertained.

Much more might be said in favour of a theory that the voyager had crossed to Greenland from Labrador, or had started from Greenland and had thereafter crossed to Iceland, thence to the Faroes, and thence to Shetland and Orkney. The successive crossings would be comparatively short. Here, also, it would be necessary to suppose that the voyage was deliberate. A theory simpler still would be that of an involuntary voyage eastward, as prisoner on board of a European ship, and a subsequent escape after reaching Europe. Something more will be said upon this subject later on.

There is, however, one circumstance that would seem to denote at the first glance, at any rate, that the Aberdeen kayak was constructed in Europe. This is that all the wood of its framework,[2] and of the implements belonging to it, is of the tree known as *Pinus silvestris*, a tree familiar to us in this country under the name of Scots fir. Now this tree, *Pinus silvestris*, does not grow in Greenland and North America, although it flourishes in Northern Europe. I am indebted for all my information on this subject to Mr. William Dawson, B.Sc., Lecturer in Forestry in the University of Aberdeen. Mr. Dawson has made a careful examination of the Aberdeen kayak, and has drawn the deduction that its wood was grown in Northern Europe, but not in an insular climate such as ours. "The wood of the

[1] See "The Eskimo about Behring Strait," by Edward William Nelson, *Smithsonian Institution Report*, Washington, 1899, Part I, p. 221.

[2] Leaving out of the question some necessary repairs made at Aberdeen in 1900.

spears in the Aberdeen kayak," writes Mr. Dawson, "shows the character of timber grown in a continental climate, and that, too, in a continental climate pretty far north or at very high elevation. The characters from which this can be deduced are (1) the extreme regularity of each season's growth, and (2) the smallness of each season's growth. Wood grown in an insular climate shows less regularity, due to the prevalence of spring frosts after growth has begun, and the consequent checking of the development of the wood, and also shows greater growths in each year owing to the longer growing season. The wood of these spears is similar in character to some of the wood we get at the present time from Norway and Sweden and from Finland, but is not similar to anything produced in this country, even in the remains of the native forests. The thrower (a small piece of wood for launching the spears) is of wider ringed wood, but it, too, is regularly grown, and might have been grown in more sheltered places in the same neighbourhood as produced the wood of the spears. The tree *Pinus silvestris* is native over a considerable part of North and Middle Europe, but the Baltic neighbourhood is its principal habitat." As already mentioned the framework of the kayak is also of *Pinus silvestris.*

It appears evident, therefore, that the wood used in this kayak of two centuries ago was grown somewhere in the Baltic region. But it does not necessarily follow that the kayak was constructed in Europe. Driftwood and wrecks are cast at times upon the coasts of Greenland, and this kayak might have been made in Greenland of European wood. It is true that Dr. Packard, in his book on *The Labrador Coast*[1] states that the Greenland kayak are framed of bone, whereas those of Labrador are framed of spruce wood. But this statement, although doubtless correct in the main, is too sweeping. It is therefore quite possible that this kayak was framed in Greenland from European driftwood. It would be something of a coincidence but it is quite a possibility.

The date of the arrival of this kayak and its owner in Aberdeen may be held to be somewhere between 1690 and 1710, according to the statement made by Douglas. Now, it is an important fact that similar captures were made in the Orkney Islands at the same period. In the words of Dr. James Wallace, a native of Orkney and a Fellow of the Royal Society of London, another kayak was "catched in Orkney" and "was sent from thence to Edinburgh." He adds that it "is to be seen in the Physicians' Hall (Edinburgh), with the oar and dart he makes use of for killing fish." Dr. Wallace published this statement in the year 1700, but before that date the kayak had been transferred from the Physicians' Hall to the University of Edinburgh. We know this from an entry in the Minute Book of the College of Physicians, dated 24th September, 1696, wherein it is stated that the Physicians had decided to present the boat in question to the University of Edinburgh, in order that it might be more safely preserved. The entry further states that "the oars of the boat and the shirt of the barbarous man that was in

[1] New York and London, 1891, p. 207.

the boat" were already in the possession of the University. From this statement we see that, as was the case at Aberdeen, the kayak-man was captured along with his kayak. It may be added that the plural "oars" of the entry evidently denotes the implements more correctly styled by Dr. Wallace "the oar and dart."

This kayak had been in the Physicians' Hall in Edinburgh for at least eight years prior to its transfer to the University. This is certain for the reason that the statement as to its presence in the Physicians' Hall was first made by Dr. Wallace's father, the Rev. James Wallace, Minister of Kirkwall in Orkney, who died in September, 1688. Wallace, senior, who had graduated at Aberdeen University in 1659, and who was a man of wide reading and of very considerable mental culture, wrote *A Description of the Isles of Orkney,* which was first published in 1693, five years after his death, The subject of the Orkney kayak-men is there introduced by him in these words (p. 33):—

"Sometime about this Country (*i.e.,* Orkney) are seen these Men which are called Finnmen. In the year 1682 one was seen sometime sailing, sometime rowing up and down in his little boat at the south end of the Isle of Eda, most of the people of the Isle flocked to see him, and when they adventured to put out a boat with men to see if they could apprehend him, he presently fled away most swiftly: and in the year 1684, another was seen from Westra, and for a while after they got few or no Fishes; for they have this Remark here, that these Finnmen drive away the fishes from the place to which they come."

After these definite statements the author adds his own comment (p. 34):—

"These Finnmen seem to be some of these people that dwell about the *Fretum Davis,* a full account of whom may be seen in the natural and moral History of the Antilles, Chap. 18. One of their Boats sent from Orkney to Edinburgh is to be seen in the Physitians hall with the Oar and the Dart he makes use of for killing Fish."[1]

The last sentence might easily be interpreted to mean that the boat sent from Orkney to Edinburgh had been obtained in Davis Straits. But this idea is negatived by the plain statement of Dr. Wallace, the author's son and editor, who tells us that the canoe in question "was catched in Orkney." Wallace, junior, indeed, applies the term "Finnmen" to the Eskimo of Davis Straits, as well as to the kayak-men of Orkney. For he observes that "a full account of these Finnmen may be had," in the work to which his father had previously referred, and which deals with the Davis Straits people only.

That work, which is in French, was written by a certain Louis de Poincy, and was published in Rotterdam in 1658. Although it relates primarily and mainly to the Antilles, the author was happily tempted to interpolate a most interesting and

[1] *A Description of the Isles of Orkney,* by the Rev. James Wallace, Minister of Kirkwall; first published at Edinburgh in 1693. The above is from the Edinburgh reprint of 1883, edited by John Small, M.A., F.S.A.Scot.

valuable account of the Davis Straits Eskimo which he had obtained from a Captain Nicholas Tunes, the commander of a Flushing vessel, who had penetrated to the north end of Davis Straits in the summer of 1656. It is obvious that Wallace, senior, had read this book and had seen its illustrations, and when we look at these latter we understand what he meant when he said that the Finnmen who were occasionally seen in Orkney waters in his day "seem to be some of these people." What he clearly tells us is that the Orkney Finnmen were identical with Eskimo. Wallace, junior, is equally explicit. As already noticed, he accepts his father's inference that the Eskimo of Davis Straits and the Finnmen of the Orkney Islands were one and the same people. He is somewhat puzzled over the circumstance that the former people should be found at such a great distance from their home; as will be seen in his opening remark in the passage about to be quoted. But his written description of the Finnmen of Orkney, and their canoes, leaves no doubt as to their appearance. The following is his comment on his father's account:—"I must acknowledge it seems a little unaccountable how these Finnmen should come on this coast, but they must probably be driven by storms from home, and cannot tell, when they are any way at sea, how to make their way home again; they have this advantage that be the seas never so boisterous, their boats being made of fish skins are so contrived that he can never sink but is like a sea-gull swimming on the top of the water. His shirt he has is so fastened to the boat that no water can come into his boat to do him damage, except when he pleases to untie it, which he never does but to ease nature or when he comes ashore."[1]

In this description Wallace, junior, absolutely identifies the Orkney Finnmen with the Davis Straits Eskimo. What is more he gives us a little bit of prosaic information, in his closing sentence, which no other writer on kayak people has ever referred to; so far as my somewhat extensive reading on this subject goes. It must be remembered that the younger Wallace was born and bred in Orkney and he had opportunities of learning many details with regard to the ordinary habits of the Finnmen—whether from his own personal observation or from that of others.

One more writer on the Orkney Finnmen must here be cited. In the year 1701 the Rev. John Brand published *A Brief Description of Orkney, Yetland, Pightland-Firth, and Caithness*, which contains similar references. Like the elder Wallace, Brand was a clergyman of the Church of Scotland, and he visited the districts named by him as one of a Commission appointed by the General Assembly of the State Church to inquire into the condition of religion and morals in those parts. In the course of his description of Orkney he observes—and it is to be remembered that he was writing twelve years after the death of Wallace, senior—"There are frequently Finnmen seen here upon the coasts, as one about a year ago [1699] on Stronsay, and another within these few months on Westray—a gentleman with many others in the Isle looking on him nigh to the shore, but

[1] Comment in edition of 1700. Cited here from Edinburgh reprint of 1693 edition (already specified), pp. 33–4.

when any endeavour to apprehend them they flee away most swiftly. . . . His boat is made of seal skins, or some kind of leather; he also hath a coat of leather upon him, and he sitteth in the middle of his boat with a little oar in his hand fishing with his lines. . . . One of their boats is kept as a rarity in the Physicians' Hall at Edinburgh."

Their are one or two points to be noted in Brand's account. It is pretty evident that he is speaking at second hand. His visit to Orkney was very brief and he could not have had much experience of Orkney life. Moreover, it is obvious that he had read Wallace's book and had taken some of his statements from it. We know, for example, that the Finnman's canoe was no longer in the Edinburgh Physicians' Hall in 1700, although it was there when Wallace wrote.[1] There is, further, an echo of Wallace's phraseology in at least one passage. Nevertheless, he had clearly made fresh enquiry on the subject, and had learned that a Finnman had been seen off the Island of Stronsay in 1699, and again in 1700 off Westray. He also adds a touch or two to the picture of a Finnman whom he describes as sitting in the middle of his canoe "with a little oar in his hands fishing with his lines." These details he had not learned from Wallace.

In addition to the Finnman's canoe which was "catched in Orkney" and sent to Edinburgh, Dr. James Wallace, writing in 1700, states that "there is another of their boats in the Church of Burra in Orkney." Burra or Burray is a small island in the southern part of the Orkney group. Its church has been a ruin for more than a century, and there is no vestige of the Finnman's canoe remaining, which is not to be wondered at considering the perishable nature of its materials. There is no reason, however, to doubt the accuracy of Dr. Wallace's statement. He may have been wrong by a few years, as he was with regard to the Physicians' Hall specimen. But a Fellow of the Royal Society of London, publishing a book in London, would not wantonly make an essentially false statement which could be refuted within a month or two after it had been made.[2]

[1] Most unfortunately, the identity of this kayak has been lost, if it is one of those preserved in the Royal Scottish Museum, Edinburgh. That museum obtained two kayaks from the University of Edinburgh in 1865, but with no history attached. One of these may be the seventeenth-century Finnman's.

[2] Dr. Wallace throws no light on the circumstances attending the acquisition of the Burray specimen. It is possible that it may be the "little boat" referred to in the Session Record of South Ronaldshay and Burray in 1661. That Record states that on Sunday, 26th May, 1661, in St. Peter's Kirk, South Ronaldshay, a collection of 16*s*. 6*d*. was taken as "charity to ane poore Yetland (*i.e.*, Shetland) man whom God had wonderfully preserved into a storme at sea into his litill boate, and taken in by ane vessell finding him upon the seas." (See Dr. Craven's *Church Life in South Ronaldshay and Burray in the Seventeenth Century*, Kirkwall, 1911, p. 36.) It is a little remarkable that a Shetlander should have been picked up by a vessel putting in at the most southern island of the Orkney group. Moreover, it is unlikely that a Shetlander of the ordinary type would be found adrift in Orkney waters in a small open boat, or that such a boat could weather a heavy storm. On the other hand, if the man was a Finnman in his kayak, coming from Shetland, or describing himself as a Shetlander, the situation would be more easily understood. It might be conjectured that the recipient of the 16*s*. 6*d*. afterwards settled in the little island of Burray, across the narrow sound, and that thus

It will now be seen that about the end of the seventeenth century there were three kayaks preserved in Scotland. One of these, with its occupant, had been captured in Orkney waters, and was preserved in Edinburgh. Another was in Marischal College, Aberdeen, having been taken, also with its occupant, in the North Sea. The third was presumably captured in Orkney waters, seeing that it was preserved in an Orkney church. There is, moreover, special mention of Finnmen still at large in Orkney at that period; near the Island of Eday in 1682, near Westray in 1684, near Stronsay in 1699, and again near Westray in 1700. It might quite well be argued that all these appearances were made by one man, and that it was he who was carried prisoner to Aberdeen, about the beginning of the eighteenth century. On this hypothesis our Orkney Finnmen could be narrowed down to three in number. On the other hand, the references of the two Wallaces manifestly indicate that the Finnmen seen in Orkney waters numbered more than three. When the traditions of the common people of Orkney and, it may be added, of Shetland come to be considered, it will be seen that the Finnmen were believed to be much more numerous.

It is somewhat remarkable that the year 1883 not only witnessed the republication of the records of the Wallaces and Brand, but two other writers also drew public attention in or about the same year to the theme which we are at present considering. One of these modern writers was John R. Tudor, whose book on *The Orkneys and Shetland* appeared in 1883. Tudor, who wrote in a lively and interesting style, had read Wallace's and Brand's books, and he naturally makes reference to the Finnmen. "What can these Finn Men have been?" he asks (*op. cit.* p. 342) "Is it possible Eskimos can have been driven over from Greenland, or can there have been a substantial basis of actual fact for the traditional Shetland Finns that 'came ow'r fa Norroway?' The Burray and Stronsay instances," he continues, "all point to the kayaks, or whatever they were, beng driven from the east, and the ones seen off Eday and Westray may, with equal probability, have come from that quarter. Besides, Cape Farewell, the nearest point of Greenland to the Orkneys, is 1180 nautical miles from the Noup Head of Westray, whilst the Norwegian coast, at the southern end of Finmarken, is 750, and at the nearest point only 240 miles."

Tudor is not the first, however, who looked eastward for the home of the Finnmen. Brand had already done so in 1700, ignoring or discrediting the Wallaces' assumption that the Finnmen had come from Davis Straits. In his estimation, the Finnmen were natives of Finland: "Which is very strange," he remarks, "that one man sitting in his little boat should come some hundred of leagues from their own coasts as they reckon Finland to be from Orkney. It may be thought wonderful how they live all that time, and are able to keep the sea so long." But although Brand regarded the Finnmen as a European race, his

his kayak was eventually preserved in the church of Burray. All this is conjecture, but the incident of 1661 seems deserving of mention in this connection.

assumption that Finland was their home is open to many objections. Tudor's suggestion is much more deserving of consideration. But before that suggestion is considered, one feature of the early references ought to be pointed out.

It will be noted that the educated class, as represented by the Wallaces and Brand, clearly regarded the Finnmen as foreigners coming from a great distance. According to one theory they came from the western side of the Atlantic, while another theory brought them from the upper Baltic. Douglas, again, who tells us of the Aberdeen kayak, believed that it had come from Labrador. The first to suggest the neighbouring country of Norway was Tudor.

Now, it is possible to say a great deal in favour of a Transatlantic origin. It will be well to shelve the "drifting" theory at once. A kayak with a man in it cannot drift a thousand, fifteen hundred, or two thousand miles. Much more can be said for a theory of journeys deliberately made from Greenland with resting-places at Iceland and the Faroes. But simpler still is the theory of captives brought by European ships who had regained their liberty on this side of the Atlantic.

The custom of bringing specimens of strange people to one's own country, with or without their consent, is a very old one, and the kayak-people have frequently been brought to Europe from across the Atlantic. A number of instances in the nineteenth century could be adduced. The same thing can be said of previous centuries. In an article on "Eskimos, Ancient and Modern,"[1] Baron A. E. Nordenskiöld refers particularly to this practice. Referring to encounters between early European voyagers and Eskimo he says, "Their meetings always ended in the murder or capture of the poor natives, who were carried away to be shown as curious animals in Europe. La Peyrère's *Report of Greenland*, written in 1647, describes them, and goes on to tell of the nine Eskimo who had been brought to Denmark by different Polar expeditions. . . . Poor Eskimo! They often looked northwards, and once tried to escape in their skiffs, but a storm cast them ashore, and some peasants caught them and took them back to Copenhagen. . . . Two of them again tried to escape in their kayaks; one was caught, the other, who got away, was drowned at sea. . . . The last of them died of grief after the failure of his third attempt to return to Greenland in his kayak. He was thirty or forty miles[2] out to sea before he was overtaken." This account of Baron Nordenskiöld's is not wholly accurate, because he has overlooked a paragraph in which La Peyrère states that two of those who were captured by peasants in their first attempt to escape actually did effect their escape on a subsequent occasion. "They were pursued as far as the entrance of the Sound, but could not be overtaken, so that," observes La Peyrère, "it is probable they were lost, it being not likely they could reach Greenland in their small boats."

This occurrence took place somewhere in the first half of the seventeenth century. It may not have been a unique occurrence. I am not aware of any

[1] *English Illustrated Magazine*, December, 1891.

[2] *Leagues*, not *miles*, in the English translation of the original.

other recorded instance of the kind, but the *argumentum ex silentio* is one to which I do not attach great weight. There may have been other successful escapes of captive Eskimo, although they are not recorded. These fugitives may have made their way to the Orkney and Shetland Islands, and have been the people described as Finnmen. This seems quite a good line of argument.

To take this view, however, is to leave out of sight many other considerations—ethnological, historical, and traditional. The last of these considerations may not appeal to all. The importance attached to tradition depends upon mental bias. In this particular case we have seen that Tudor, in 1883, recognized a connection between the positive statements of seventeenth-century chroniclers and the traditions of the common people that have come down to our own time. He puts the question:—"Can there have been a substantial basis of actual fact for the traditional Shetland Finns that 'came ow'r fa Norroway'?" The traditions referred to can only be noticed very briefly here.

They are current to-day among people of the old Norse stock in Orkney and Shetland, and they are to this effect. A race of "Finns" or "Finfolk," men and women, used to visit these archipelagoes and the neighbouring county of Caithness several generations ago. The Finn women are chiefly remembered as witches and fortune-tellers, who were always careful to exact payment for the exercise of their art. They were also skilful in curing disease in men and cattle; and they frequently made a living by knitting and spinning. Sometimes they were merely strolling beggars. When a Finn woman settled in Orkney she professed to be a native of Shetland or of Caithness. When in Shetland, she alleged that she came from Orkney or Caithness. The Finnmen were also very skilful in curing diseases, and the words quoted by Tudor are those of a song relating to a Finnman who came across from Norway to Shetland to cure the toothache. Both the men and the women possessed a specially prepared skin, which enabled them to swim like a seal in the sea. When they came ashore they discarded this skin. That is one version. Another version simply speaks of this skin as a boat, which they propelled at a marvellous speed. It is said that they could pull across to Bergen from Shetland in a few hours, making nine miles at every stroke. With the statements of the Wallaces and Brand in view, it seems quite obvious that these swift sea-skins or boats were simply the kayaks already described.[1]

[1] It is of interest to quote here the impression made upon Dr. G. F. Wright and Mr. Warren Upham by the advent of Eskimo from seaward, while the American party were camped on the West Greenland coast. The description, at pp. 143–4 of *Greenland Icefields* (London, 1896), is in these words:—

"At one time, while in camp at Ikamiut, when the wind was blowing a gale, shutting us up all day in our tent and tossing the waves of the fiord into such commotion that it would have been madness for any large boat to have ventured upon the water, we were thrilled by the cry that some kayakers were coming. They were three that belonged to the little settlement, and had come that day, as a matter of course, from Sukkertoppen, which was twenty miles distant. Upon reaching the shore and pulling themselves loose from their shells, the kayakers ran their hands into the apertures from which they had drawn their limbs [legs], and brought out various objects of merchandise which they had purchased at the store for their families. Then

Thus, although the ministers and doctors of the seventeenth century were puzzled as to the place of origin of the Finnmen, the peasantry of Orkney and Shetland had a much more intimate knowledge of them and of their ways. It is true that they also regarded the Finns as foreigners, but all their memories of them denote a considerable amount of intercourse between the two races, with occasional intermarriages. And the Finns are chiefly associated with Norway in these traditions, although one writer reports them as having come from the Faroe Islands, while other stories point to their still retaining a foothold in past centuries in the Orkney and Shetland Islands. "It is a historic fact," observes Mr. Nelson Annandale, who has noted certain traces of Mongoloid blood in Iceland and the Faroes, "that in the ninth century and earlier the Scandinavians intermarried with the Lapps or 'Finns,' as they were originally called. . . . Moreover," continues Mr. Annandale, "Beddoe, than whom we could have no safer guide in physical anthropology, believes that physical traces of Mongolian ancestry can be detected in the Shetlanders."[1]

It will be remembered that the people of Shetland, and in a less degree of Orkney, are mainly descended from Norse colonists of the ninth century, at which period Finn marriages were not very uncommon. Harold Haarfager himself married a Finn woman,[2] by whom he had four sons, and one of these (Halfdan) ruled over Orkney for a short period. Further, the Finns of Norwegian history bore exactly the same reputation for magical powers as the Finns of Orkney and Shetland tradition. Moreover, we do not require to look so far north as modern Finmark and Lapland to find those people in mediæval times. "It may be quoted as a strong piece of evidence," observes Dr. Nansen, "that a people called Finns must have lived in old times in south Norway, that the oldest Christian laws of about 1150 for the most southern jurisdictions, the Borgathing and Eidsvathing, visit with the severest penalty of the law the crime of going to the Finns or to Finmark to have one's fortune told (*cf.*, A. M. Hansen, 1907, p. 79)." Dr. Nansen points to "Finn" in many place-names of southern Scandinavia, and to a "Finmarken" situated to the east of Christiania. It is not to be supposed that the people of southern Scandinavia in the twelfth century made long and toilsome journeys to the extreme north of the peninsula in order to have their fortunes told.[3]

Indeed, the conclusion is almost inevitable that these twelfth-century laws were enacted for the purpose of suppressing an every-day practice, and that the Finns, or Lapps consulted were living in the south of Norway. Granting

they severally took up their kayaks and carried them to a secure place, and disappeared in the igloos [huts of earth and stones], where their families soon joined them to talk over the adventures of the week. To us they seemed like inhabitants of the sea, who were accustomed to shed their skins on coming out of the water."

[1] *The Faroes and Iceland*, by Nelson Annandale, Oxford, 1905, pp. 163–164.

[2] Snaefrid, daughter of Svase, the Finn or Lapp.

[3] See Dr. Nansen's *In Northern Mists*, London, 1911, vol. i, p. 206, etc.

that they were there in considerable numbers in the twelfth century, their existence in that locality may have been prolonged for centuries. Lord Avebury, indeed, points to the presence of Lapp families in southern Norway in the end of the nineteenth century.[1]

But if these South Norwegian Lapps were the Finnfolk who visited Orkney and Shetland in the seventeenth century, it would be necessary to bring forward evidence from Scandinavia to show that the Lapps in Norway at that date made use of kayaks. Such evidence appears to be wanting at present. That skin boats of some kind were once used by their forefathers is a traditional belief among the Mountain Lapps. Baron Von Duben tells us[2] that the Mountain Lapps assign to their remote ancestors a home lying far to the south-east, apparently on the Indo-Persian frontier. Thence, they allege, they were driven by their enemies, and wandered westward and northward in two divisions, the former of which eventually reached the sound separating Denmark from Sweden. This they ferried across in their small skin boats; and, when the sea was calm, conveyed their goods over on reindeer-skin buoys linked together and drawn by swimming reindeer. Their herds also swam across. Thus did the forefathers of the Mountain Lapps enter Sweden.

Von Düben further points out[3] that the names of sailing vessels and large boats are all importations into the Lapp language, whereas, on the other hand, the only really Lapp name for a boat denotes a skin canoe, propelled by paddles, and devoid of rowers' seats and steering place.

Tradition and language agree, therefore, in ascribing to the Lapps, before and after their entrance into Scandinavia, the use of skin boats. There is nothing in the evidence to show that these skin boats were *not* kayaks. But, admitting that they were, the period indicated is remote. What is needed is some proof of their use in the peninsula in comparatively recent centuries.

The possibility of proving this is complicated by the undoubted presence of transatlantic kayaks in the museums and churches of Europe. La Peyrère, whose account of the Greenland captives has already been cited, states that their kayaks were still to be seen in Denmark, and that he had seen two of them in Copenhagen. That was in 1647. Then Olaus Magnus tells how in 1505 he saw two of the leather skiffs of the Greenland pirates hanging in the cathedral at Asloë. They were said to have been captured by King Haco, whose warships these kayak-men had tried to sink. For Olaus states that these "pirates," as he calls them, had the power of going underneath ships and boring holes in the bottom, so that they foundered.[4] By this means, says Olaus, the Greenland kayak-men, or pirates,

[1] *Prehistoric Times*, ed. 1900, p. 281.

[2] *Om Lappland och Lapparne*, Stockholm, 1873, pp. 372–3.

[3] *Op. cit.*, p. 387, *note.*

[4] This idea seems to be derived from the kayak-man's accomplishment of upsetting himself and his canoe, many consecutive times; and of a confusion between the kayak-man and the narwhal, which was credited with the power of sinking a ship at sea by running its tusk into it and splitting it up. (See p. 468 of English translation of La Peyrère's *Greenland.*)

obtained great booty from merchant ships.[1] In making use of this reference, Dr. Nansen quotes two other Scandinavian writers, one of the year 1532 and another of 1551, who agree in charging the Greenland kayak-men with frequent and successful piracy.[2]

The earliest example (after those attributed to King Haco) of a kayak preserved as a trophy in a European church is also furnished by Dr. Nansen. It is of the year 1430. The chronicler is a certain Dane named Claudius Claussön, or Clavus, who informs us that to the west of the Wild Lapps "are the little Pygmies, a cubit high, whom I have seen," he affirms, "after they were taken at sea in a little hide-boat, which is now (about 1430) hanging in the cathedral at Nidaros (Trondhjem). There is likewise," he goes on to say, "a long vessel of hides, which was also once taken with such Pygmies in it."[3]

Dr. Nansen also cites Michel Beheim, who travelled in Norway in 1450. There he saw or heard of a people called "Skraelings" who are only three "spans" high, but are nevertheless dangerous opponents both on sea and land. "They live in caves which they dig out in the mountains, make ships of hides, eat raw meat and raw fish, and drink blood with it." Then there is the similar testimony by Archbishop Erik Walkendorf, who, in his description of Finmark, written about 1520, says: "Finmark has on its north-north-west a people of short and small stature, namely, a cubit and a half, who are commonly called 'Skraelinger'; they are an unwarlike people, for fifteen of them do not dare to approach one Christian or Russian either for combat or parley. They live in underground houses, so that one neither can examine them nor capture them."[4]

To these extracts must be added a statement by Cardinal Bembo, who lived from 1470–1547, and who refers to an incident of his own time. I quote Bembo's statement on the authority and in the words of an American writer of the year 1892.[5] "In 1508, a French ship picked up near the English coast a small boat, made of bark and osiers, containing seven men of medium height, darkish hue, and attired in fish skins, and painted straw caps. Their broad faces with their habit of eating raw flesh and drinking blood would imply that they were Eskimos; but it is difficult," observes this modern American writer, "to conceive of a boat drifting across the Atlantic with sufficient stores of food to avoid cannibalism. Cardinal Bembo adds, however, that six of them died—which may mean that they had been starving—and that the sole survivor was taken to Louis XII."

Now, although the boat in question was not a skin boat, one can hardly dissociate it and its occupants from the people here spoken of. Their habit of eating raw meat and drinking blood at once links them with the Skraelings

[1] *Historia de gentibus Septentrionalibus*, lib. ii, c. 9. *De scorteis seu coriariis navibus piratarum Gruntlandiae.* Rome, MDLV.

[2] *In Northern Mists*, vol. ii, p. 127.

[3] *In Northern Mists*, vol. ii, p. 269.

[4] For these extracts from Beheim and Walkendorf, see *In Northern Mists*, vol. ii, pp. 85–6.

[5] *Atlantic Monthly*, July, 1892, p. 140.

described by Beheim fifty-eight years earlier.[1] And in both cases the question arises: Did these people belong to Greenland or to Europe?

If we accept the name "Greenland" in the wide sense given to it in the seventeenth century by Danes, the answer might be that they belonged to Greenland *and* to Europe, because Greenland was then supposed to include the islands of Jan Mayen and Spitsbergen, and to extend eastwards to Nova Zembla. Greenland was even believed to be united to Siberia, or "The Great Tartary."[2] In his account of the important whaling station of Spitsbergen, Martinière does not make use of the name "Spitsbergen," but simply calls it "Greenland." No doubt that was the name commonly given to that coast by the members of the Danish expedition to which he was attached. It is not very unlikely, keeping this terminology in view, that the kayak-using natives of the Vaigatz region, some of whom were brought to

[1] The story of a "sea-man" captured off the Yorkshire coast, near Skinningrave, in 1535, is worth recording here. It is found in "an ancient manuscript in the *Cott. Library* (marked Julius F.C. fol. 455), descriptive of the lordship of Guisborough and the adjacent coast," as stated by the Rev. John Graves in his *History of Cleveland* (Carlisle, 1808, p. 34). Graves introduces the story thus (p. 369): "Camden mentions the report of a *sea-man* being caught by the fishermen here; and the same fabulous story is thus more particularly related in the ancient MS. above quoted: 'Old Men that would be loath to have their Credyt crackt by a Tale of a stale Date, report confidently that sixty Yeares since, or perhaps 80 or more, a *sea-man* was taken by the Fishers of that place [Skinningrave], where duringe many weeks they kepte in an oulde House, giving him rawe Fishe to eate, for all other fare he refused; insteade of Voyce he skreeked, and shewed himself courteous to such as flocked farre and neare to visit him;—fayre Maydes were wellcomest Guests to his Harbour, whome he woulde beholde with a very earneste Countenaynce, as if his phlegmaticke Breaste had been touched w^th^ a Sparke of Love.—One Day, when the good Demeanour of this newe Gueste had made his Hosts secure of his Abode w^th^ them, he prively stoale out of Doores, and ere he coulde be overtaken recovered the Sea, whereinto he plounged himself;—yet as one that woulde not unmannerly depart without taking of his Leave, from the mydle upwardes he raysed his Shoulders often above the Waves, and makinge signes of acknowledging his good Enterteinment to such as beheld him on the Shore, as they interpreted yt;—after a pretty while he dived downe and appeared no more.'" In his *History of Whitby* (Whitby, 1817, p. 798, *note*), Young suggests that this "sea-man" may have been a seal. This idea may find support from the manner of his final disappearance. It is a fact, also, that seals eat their fish raw. On the other hand, a seal could hardly live in a house for many weeks without water to bathe. Moreover, it may be questioned whether a captive seal on the Yorkshire coast in the sixteenth century would attract people from far and near; nor is it likely that a seal would pay special attention to "fayre maydes." Much more might be said in favour of the view that this "sea-man" was of the same kind as the Orkney Finnmen of the seventeenth century, and that he made his escape by retrieving his captured kayak, although the traditional account speaks of his diving under water like a marine animal. Apparently the story was not recorded in writing until eighty years after the event, by which time the details may have become blurred in the popular memory.

Mention may also be made of the sea-woman captured near Edam, West Friesland, in 1430. The Friesland girls dressed her in clothes like their own, and taught her to spin. She was afterwards taken to Haarlem, where she lived for several years, and was instructed in her duty to God. So says Parival, in his *Délices de Hollande*, according to Mr. Baring-Gould (*Curious Myths of the Middle Ages*, 1868, II, 244). It is difficult to reconcile some of these statements with the idea of a marine animal, although they would be quite intelligible if the captive was a woman of Eskimo type.

[2] La Peyrère.

Copenhagen by this expedition, were loosely styled "Greenlanders." The date of this capture was 1653, and it is quite conceivable that a picture of certain "Greenlanders" which was painted at Bergen in 1654[1] represents these very people. I do not press this point, but the idea seems to me worthy of consideration.

This wider acceptation of the term "Greenland" would explain some of the references to "Greenland pirates" already noted. If the two kayaks seen by Olaus Magnus were really captured by King Haco, as alleged, in the second half of the thirteenth century, after an attack made by the "Greenland pirates" upon his battleships, did that encounter take place in the neighbourhood of Cape Farewell? A similar question may be put with reference to the merchant vessels which, according to Olaus and two other Scandinavian writers of the sixteenth century, were frequently attacked and plundered by the Greenland pirates. Was the scene of their operations always on the other side of the Atlantic? It is noteworthy, in this connection, that the Shetland traditions of the Finns speak of them as pursuing boats at sea, and demanding and obtaining money from the fishermen. Mention may also be made of the instructions given by Sebastian Cabot in 1553 to Sir Hugh Willoughby's expedition to Northern Europe and Siberia. Cabot was then Governor of the Merchant Adventurers of England, and in that capacity he issued a series of "ordinances" to the expedition. These are all quite sensible and practical, and although the one about to be quoted—the 31st—is couched in terms that cannot be accepted literally, it is evident that Cabot was warning the expedition against a real danger. The paragraph is as follows: "Item, there are people that can swim in the sea, havens and rivers, naked, having bows and shafts, coveting to draw nigh to your ships, which, if they shall find not well watched or warded, they will assault, desirous of the bodies of men, which they covet for meat: if you resist them they dive, and so will flee, and therefore diligent watch is to be kept both day and night in some islands."[2]

Discounting the accusation of cannibalism, and assuming that the other expressions are based upon the confused reports of previous voyagers, we have in this ordinance the suggestion that in certain islands between England and the Straits of Vaigatz there were people of proclivities similar to those attributed to the Greenland pirates by Olaus Magnus, a contemporary of Sebastian Cabot's. Olaus tells us that those people dive under ships and bore holes in the bottoms so that they founder. We may believe that both he and Cabot were speaking of real people, without necessarily accepting all their statements as true. The most interesting feature in Cabot's statement is that he is undoubtedly referring to a people inhabiting certain parts of North-Western or Northern Europe.

Two writers of the fifteenth century and one of the sixteenth have already been quoted who speak of a people in the north-west of Norway known as

[1] This painting is preserved in the Ethnographical Museum, Copenhagen, and it has been reproduced in Nordenskiöld's *Voyage of the Vega* (English translation), where it has received the title of "New World Polar Dress."

[2] *Pinkerton's Voyages and Travels*, vol. i, London, 1808, p. 6.

"Skraelings," who made use of skin boats and lived in caves and underground houses. It will be remembered that this name "Skraeling" was applied by the Norsemen to the Eskimo whom they encountered in North America in the eleventh century. They sometimes referred to them also as "Lapps," and at other times as "trolls." There is no evidence that those Eskimo represented a type of man previously unknown to the Norsemen.

The general conclusion to be drawn from these various references seems to me to be substantially that drawn by Buffon in the eighteenth century: that the people of the Arctic Circle were at one time "nearly alike." A more modern ethnologist, Charles H. Chambers, a former member of this Society, expressed himself in similar terms in 1864. Unfortunately, he does not give any reasons for the conclusion he arrived at, which he briefly states in these words: "I believe the race which inhabited the northern shores of Europe to have been akin to the Laps, Fins and Esquimaux, and the Pickts or Pechts of Scotland, and to have given rise to many of the dwarf, troll, and fairy stories extant among the Sagas and elsewhere."[1] Sir George Dasent clearly favoured this view, although he expressed himself with much greater caution. In his opinion, the Orkney and Shetland groups, prior to the arrival of the Norsemen in the ninth century, were inhabited by two races, the dwellers in the underground houses and those who inhabited the circular towers commonly known as "Brochs," of both of which structures specimens are yet to be seen. "What these races were," observes Dasent, "whether the first which dwelt underground were Esquimaux of Turanian race, while the Burghs, or castles or Picts' houses, are the handiwork of that mysterious race of Picts so long the terror of British Antiquaries, may be matter of doubt."[2] It will be observed that these terms are so extremely cautious that Dasent commits himself to nothing. But he shows that he entertained ideas not very different from those to which Chambers gives direct expression.

It may be added, in conclusion, that Orkney tradition alleges that the Finnmen were the precursors of the Norsemen in Orkney, and that these islands were, in the local phraseology, "won from the Finnfolk." An Orkney tradition, recorded by the late Walter Traill Dennison, asserts that the little island of Eyn-Hallow, lying between the island of Rousay and the mainland of Orkney, was the last refuge of the Finnfolk.[3] A Shetland song assigns to them the lonely islet of Sule Skerry, situated midway between Hoy Head, Orkney, and Cape Wrath. The lines embodying this idea, as well as the belief that Finnmen were seals or "selkies" when they were in the sea, although quite human when on shore, are as follows:—

> "I am a man upo' da land;
> I am a selkie i' da sea.
> An whin I'm far fa every strand,
> My dwelling is in Shöol Skerry."

[1] *Anthropological Review*, 1864.
[2] *The Orkneyingers' Saga*, Rolls Series, 1894, Introduction, p. 5.
[3] *The Scottish Antiquary*, January, 1893, p. 118.

This rhyme, with many other interesting traditional references to the Finnfolk, was published by Dr. Karl Blind in the course of a series of papers on "Scottish, Shetlandic, and Germanic Water Tales," contributed to *The Contemporary Review* of 1881 and to *The Gentleman's Magazine* of 1882. It is not unlikely that these papers led to the re-printing of Wallace's and Brand's books in 1883. There can be no doubt, at any rate, that the publication of the historical and the traditional accounts in 1881–1883 stimulated Tudor, in 1883, to point out the manifest connection between them.

One other detail must be referred to. It is evident that the Orkney and Shetland traditions of Finn women who cast off their "skins" on coming ashore point to the use of the kayak among women. At the present day, the weight of evidence is strongly against the use of the kayak by women, who are almost exclusively spoken of as using only the large open oomiak, thence known as "the women's boat." Nevertheless, two Angmagsalik Eskimo women possessed kayaks in 1883–85.[1] Mr. David Hanbury speaks also to a restricted use of the kayak by the Hudson's Bay women, when he states that the men do not trust their women in kayaks "unless they are lashed together so as to form a raft." Those kayaks of the western Hudson's Bay coast are covered with deer skin, however, and are lighter and crankier than those covered with seal skin. Mr. Hanbury (*op. cit.*, p. 3) remarks that the men "feel perfectly at home in them so long as they are under way, but exercise great caution when at rest. I observed," he adds, "that they invariably landed when they wished to light their pipes, or even to take a cup of water." It is to be noted, however, that Baffin, pilot of the *Patience*, one of Captain Hall's ships in 1612, says of the Greenland Eskimo: "Every one, both man and woman, has a boat covered with seal's skin, close sewed, that no water can enter them."[2] Whittier's reference to the "squaw in her small kyack" may, therefore, be well founded. Whittier was thoroughly versed in the traditional lore of the region in which his poem (*The Bay of the Seven Islands*) is placed, and he had probably good reason for assigning a kayak to a Labrador Eskimo woman. Many other accounts might be cited which bear a distinctly opposite testimony, and the statement is repeatedly made that the kayak is exclusively a man's boat. So far as regards Europe, we have seen that one of the occupants of the two-holed kayak captured near Vaigatz in 1653 was a woman. The traditional references in Orkney and Shetland consequently receive some support on both sides of the Atlantic.

It is obvious that the recognition of a race of kayak-using people in seventeenth-century Europe opens up a wide field of enquiry. It means that the type known as "Magdalenian" has persisted in Europe down to a recent date, if not actually to the present day. A further consequence is that the name "Lapp" offers only a very partial solution of the problem presented.

[1] *Meddelelser om Grønland*, 10de Hefte, Text, 384.
[2] Hakluyt Soc., Arctic vol., Lond., 1894.

DESCRIPTION OF KAYAK PRESERVED IN THE ANTHROPOLOGICAL MUSEUM OF THE UNIVERSITY OF ABERDEEN.

[WITH PLATE XXXVI.]

BY R. W. REID, Professor of Anatomy and Curator of the Anthropological Museum.

THE general appearance of the *kayak* is well seen in the accompanying illustrations (Plate XXXVI). It measures 5,400 mm. (17 feet 9 inches) in length, 450 mm. (1 foot $5\frac{3}{4}$ inches) in its greatest breadth, and 230 mm. ($9\frac{1}{8}$ inches) in its greatest depth. It weighs, without implements, 15·4 kilograms (34 pounds). Its bottom is flat, excepting for the distance of about 760 mm. (2 feet $5\frac{7}{8}$ inches) from its bow and 660 mm. (2 feet 2 inches) from its stern, where it gradually rises to the pointed ends of the kayak. The deck is flat, with the exception of the extremities, which are very slightly elevated, and it presents a little behind its middle a nearly circular aperture—manhole—measuring 400 mm. (1 foot $3\frac{3}{4}$ inches) in its antero-posterior and 385 mm. (1 foot $3\frac{1}{8}$ inches) in its transverse diameter. Immediately behind the manhole are two strips of hide, each of an average diameter of 6 mm. ($\frac{1}{4}$ inch), attached to the margins of the kayak and crossing the upper surface of the deck. The strips are arranged in such a way that the one next the manhole passes through a slit in the one next the stern, so as to give the general appearance of a crossing in the middle line 205 mm. ($8\frac{1}{10}$ inches) behind the manhole. About 450 mm. (1 foot $5\frac{3}{4}$ inches) in front of the manhole a single strip of hide, attached to the edges of the boat, crosses the deck transversely.

The kayak is made of four seal skins stretched over a slender framework of wood. The skins have their subcutaneous surfaces next to the cavity of the kayak. Their edges are overlapped and sewed together with strips of tendon, in such a way as to produce a neat, smooth, flat and very strong seam. The only seams in the bottom and sides of the kayak are those which join the skins transversely. Seams in other directions, chiefly longitudinal, exist in the deck only. The framework is made of pieces of redwood, which average about 27 mm. ($1\frac{1}{10}$ inches) in breadth by 19 mm. ($\frac{19}{25}$ inch) in thickness, and are lashed together by strips of whalebone and hide.

(Bounding the manhole is a wooden girth which was inserted in 1900 *to replace the original girth, which had become so decayed that it crumbled away. It is lashed to the adjacent seal-skin deck by a hempen rope which at the same date was inserted to replace the original strip of hide which had been used for the purpose. Three pieces of timber are seen through the manhole with iron nails piercing one of them. These are*

not the original timbers, but were also inserted in 1900 *in order to strengthen the framework of the kayak.*)

With the kayak are a paddle, a spear, a bird-spear, a throwing-stick, and a harpoon. All are made of redwood with bone and ivory mountings (Plate XXXVI, Fig. 2).

The *paddle* is 1,900 mm. (6 feet $2\frac{3}{4}$ inches) long and 65 mm. ($2\frac{3}{5}$ inches) in its greatest breadth. It consists of two halves which overlap one another for the distance of 605 mm. (1 foot $11\frac{7}{8}$ inches) and so form the handle. The plane of the overlap is at right angles to the plane of the blades. The two halves are joined together by seven wooden pegs and by a strip of whalebone about 5 mm. ($\frac{1}{5}$ inch) in breadth, wound spirally round so as to make a lashing 110 mm. ($4\frac{2}{5}$ inches) long at either end of the handle. The wooden pegs average about 4 mm. ($\frac{3}{20}$ inch) in diameter. One blade shows a bone tip and incomplete bone edging. The other is somewhat broken, but remains of bone edging still exist. The greatest thickness of the bone edging is 4 mm. ($\frac{3}{20}$ inch), and the greatest width is 5 mm. ($\frac{1}{5}$ inch). In one paddle a strip of bone whose greatest breadth is 11 mm. ($\frac{9}{20}$ inch) has been attached for the purpose of making good a deficiency in the wooden part of the blade. The bone tip receives the end of the blade in a socket, the two being secured by two ivory pegs. The greatest breadth of the tip is 68 mm. ($2\frac{7}{10}$ inches), the greatest length 34 mm. ($1\frac{3}{10}$ inches), and the greatest thickness 9 mm. ($\frac{9}{25}$ inch).

The *spear* is complete and shows a shaft in redwood 1,670 mm. (5 feet $5\frac{3}{4}$ inches) long, and 45 mm. ($1\frac{4}{5}$ inches) in greatest width. It is somewhat laterally compressed, excepting in front, where it presents a more circular outline. A bone finger-rest about 48 mm. ($1\frac{9}{10}$ inches) long, 15 mm. ($\frac{3}{5}$ inch) broad, and 6 mm. ($\frac{1}{4}$ inch) thick, projects slightly backwards from the rounded edge of the shaft 908 mm. (2 feet $11\frac{3}{4}$ inches) from the butt end. To the head of the shaft is attached, by four ivory pegs, each 5 mm. ($\frac{1}{5}$ inch) in diameter, a plate of bone measuring 50 mm. (2 inches) by 45 mm. ($1\frac{4}{5}$ inches) and 9 mm. ($\frac{2}{5}$ inch) thick. In the centre of this plate is a shallow, circular socket, 7 mm. ($\frac{3}{10}$ inch) in diameter, in which rests a nipple projecting from the base of the head of the spear. The head of the spear is made of one piece of bone, and, like the shaft, is compressed laterally. It measures 278 mm. (11 inches) in length, 25 mm. (1 inch) in greatest breadth, and 17 mm. ($\frac{7}{10}$ inch) in greatest thickness. It is movable on the shaft, but lashed to it by a strip of hide arranged in such a way as to permit of the nipple on the base of the head freeing itself from the socket on the head of the shaft. The nipple, which rests in the socket on the head of the shaft, measures 7 mm. ($\frac{3}{10}$ inch) in diameter and projects 2 mm. ($\frac{1}{12}$ inch). A leaf-shaped tip of iron 73 mm. ($2\frac{9}{10}$ inches) by 34 mm. ($1\frac{3}{10}$ inches) by 3 mm. ($\frac{1}{8}$ inch) is inserted into a slot in the point of the head and retained in position by an iron rivet.

The *bird-spear* is incomplete, the part of the shaft in front of the barbed bone points being absent. The shaft is in redwood, rounded, and tapers towards the butt, which is surmounted by a small ivory plate slightly excavated upon its free surface. The portion of the shaft which is present measures 542 mm. (1 foot

$9\frac{3}{8}$ inches) in length, 28 mm. ($1\frac{1}{10}$ inches) in its greatest diameter, and 12 mm. ($\frac{1}{2}$ inch) in its smallest diameter. The ivory plate is 13 mm. ($\frac{13}{25}$ inch) in its greatest diameter, 11 mm. ($\frac{9}{20}$ inch) in its smallest diameter, and 5 mm. ($\frac{1}{5}$ inch) in thickness. To the forepart of this incomplete shaft are lashed, at equal distances, four bone points diverging from one another so that the diameter of the circle in which their tips lie is 95 mm. ($3\frac{4}{5}$ inches). Each point measures 128 mm. ($5\frac{1}{10}$ inches) long, is flattened, curved outwards, and shows two barbs projecting backwards from its inner border. The greatest breadth of each point is 15 mm. ($\frac{3}{5}$ inch), and the greatest thickness 6 mm. ($\frac{1}{4}$ inch). The points are bound together and to the shaft by cords of plaited tendon.

The *throwing-stick*, in redwood, measures 482 mm. (1 foot 7 inches) in length and 65 mm. ($2\frac{3}{5}$ inches) in greatest breadth. It is deeply grooved on its upper surface for the lodgment of the shaft of the bird-spear, and presents at its hinder end an ivory pin projecting upwards and forwards. The pin is held in position by a lashing of strips of tendon and by a flat four-sided bony plate, which is secured by ivory pegs to the upper edge of the throwing-stick immediately behind the pin. The ivory pin measures 19 mm. ($\frac{19}{25}$ inch) in length, 9 mm. ($\frac{9}{25}$ inch) in its greatest breadth, and 5 mm. ($\frac{1}{5}$ inch) in thickness. The forepart of the throwing-stick shows on one border a notch in which the right thumb can comfortably lie, and on the opposite border a rounded hole admitting a finger. The hole measures about 20 mm. ($\frac{4}{5}$ inch) in diameter, and its outer side is completed by a plate of bone attached to the edge of the throwing-stick by four ivory pegs. The plate of bone measures 94 mm. ($3\frac{7}{10}$ inches) long, 11 mm. ($\frac{11}{25}$ inch) in greatest breadth, and 6 mm. ($\frac{1}{4}$ inch) in greatest thickness. A splitting in the wood which runs from the finger-opening to the end of the stick has been repaired by three cross bands of bone. Two of these bands, each measuring 35 mm. ($1\frac{3}{8}$ inches) by 6 mm. ($\frac{1}{4}$ inch), are sunk and fixed to the under surface of the throwing-stick by four ivory pegs. The other band is fixed by four ivory pegs and accurately adapted to the end of the throwing-stick.

The *harpoon* measures 1,980 mm. (6 feet $3\frac{1}{8}$ inches) in length. The shaft, in redwood, is 1,670 mm. (5 feet $5\frac{7}{8}$ inches) in length and 45 mm. ($1\frac{4}{5}$ inches) in greatest breadth, and more or less circular on section, excepting at the butt, where it is flattened. On one side of the shaft a bone finger-rest projects somewhat backwards for a distance of 15 mm. ($\frac{3}{5}$ inch) at a point 570 mm. (1 foot $10\frac{1}{2}$ inches) from the butt of the harpoon. 52 mm. ($2\frac{1}{10}$ inches) behind the finger-rest a wooden peg projects 10 mm. ($\frac{2}{5}$ inch) from the shaft in a direction at right angles to that of the finger-rest. An elongated flat leaf-shaped piece of bone is attached by its stalk to the butt of the shaft by two wooden pegs, each having a diameter of 6 mm. ($\frac{1}{4}$ inch). The portion of the bone free of the shaft thins slightly and gradually expands somewhat outwards. It measures 290 mm. ($11\frac{3}{8}$ inches) in length, 42 mm. ($1\frac{7}{10}$ inches) in greatest breadth, and 10 mm. ($\frac{2}{5}$ inch) in greatest thickness. On the opposite side of the butt there remains only a small fragment of what had probably been a similarly shaped piece

of bone. Projecting from the butt also is a bony nipple with a shallow depression on its top. It is 11 mm. ($\frac{11}{25}$ inch) long, 10 mm. ($\frac{10}{25}$ inch) broad, and 8 mm. ($\frac{8}{25}$ inch) thick. The head of the shaft of the harpoon and the head of the harpoon present appearances corresponding with those described in connection with the spear, with the exception that the head is more rounded in outline and tapers gradually from base to point. The nipple on the base of the head is worn off, and the front of the head, instead of supporting an iron tip, presents a surface flattened at right angles to the long axis of the head. The flat bone plate on the shaft for the support of the head of the spear measures 41 mm. ($1\frac{3}{5}$ inches) by 37 mm. ($1\frac{1}{2}$ inches), and is 7 mm. ($\frac{7}{25}$ inch) thick. The head of the spear measures 217 mm. ($8\frac{1}{2}$ inches) long, 24 mm. ($\frac{24}{25}$ inch) in diameter at its base, and 11 mm. ($\frac{11}{25}$ inch) at its point.

Journal of the Royal Anthropological Institute, Vol. XLII, 1912, *Plate XXXVI.*

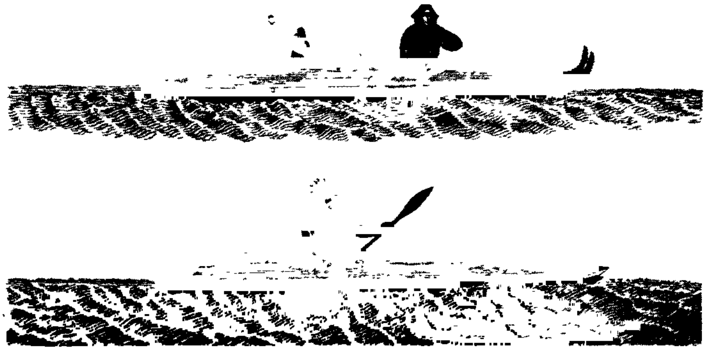


FIG. 1.

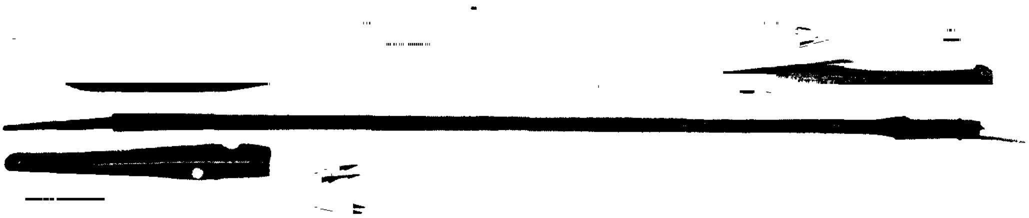


FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

THE KAYAK IN NORTH-WESTERN EUROPE.

CAVE EXPLORATION AT GIBRALTAR IN 1911.

By W. L. H. Duckworth, M.D., Sc.D., Cambridge.

Introductory.

This report deals with the cave exploration I was able to carry out in 1911, continuing the work commenced in 1910, described in the *Journal of the Royal Anthropological Institute*, vol. xli, 1911, July to December.

As in 1910, I have to express my very cordial thanks to the various authorities, as follows:—

His Excellency the Acting Governor (General T. Perrott, C.B.) kindly renewed his permission to visit various parts of the Rock. For permission to visit the Mediterranean side of the Rock and Sewell's Cave I desire to thank the Admiral Superintendent (Rear-Admiral F. S. Pelham).

The following officers and their assistants also interested themselves in the work and gave very material help in various ways:—

The Naval Secretary (L. Warleigh, Esq.).
The Superintending Civil Engineer (E. Wakeford, Esq., M.I.C.E.).
Deputy Expense Accounts Officer (F. W. Cary, Esq.).
Deputy Ordnance Store Officer (G. A. Storey, Esq.).
Colonel Grant, R.E.
Major Sewell, R.E.
Lieut. Smythe, R.E.
The Attorney-General of Gibraltar (B. H. T. Frere, Esq., K.C., LL.B.).
Mr. Coleman.

Again, as in 1910, His Excellency the Acting Governor kindly gave permission for such objects as bones and pottery found in the course of the excavations, to be temporarily deposited in the Cambridge Museums, where they now are.

I.

The parts of the Rock visited in 1911 were as follows:—

(*a*) Forbes Quarry: this was found to be filled with *débris* from the great landslip of 1910. The cave described in my former report is accessible only with great difficulty. The condition of the quarry gives an admirable demonstration of the mode in which a cave may be effectually sealed up after having been accessible for many years.

(*b*) In 1910 I received information to the effect that bones had been found in a fissure near Beefsteak Cave on Europa Flats. This information, although definite, seems to be in part inaccurate, for it was stated that the bones were found in the time of Admiral Acland (then Admiral Superintendent), and that he directed the removal of the greater part of the same. But inquiry shows that this part of the statement is incorrect. Admiral Sir W. A. D. Acland has been kind enough to inform me that the excavation he was interested in was that of the cave now known as Mediterranean Cave, near the eastern end of the Admiralty Tunnel. But Mediterranean Cave yielded no animal remains (whether fossil or other) of great importance, though I am glad to have this opportunity of referring to the most careful and able account of that cave (with plan and sections) published by H. D. Acland, Esq., F.G.S. (brother of Admiral Sir W. A. D. Acland), in the *Quarterly Journal of the Geological Society* (February, 1904, vol. lx).

On the afternoon of September 5th, 1911, I visited Beefsteak Cave in pursuance of the information mentioned above, and near that cave I found a fissure corresponding apparently to that described to me as having yielded bones. The fissure was not empty, and with the co-operation of Major Sewell, R.E., and Lieutenant Smythe, R.E., arrangements were made for clearing it out. This was done on September 6th and on the morning of September 7th.

The fissure contained loose blocks of limestone, and miscellaneous rubbish mingled with bones of modern domestic animals. Below 4 feet of this rubbish and at a depth of nearly 6 feet from the surface, the well-like fissure yielded black and red earth with very heavy mineralized and stalagmite-encrusted bones of a stag. Among these, some metal buttons of a tunic were found, and these were handed to His Excellency the Acting Governor (General T. Perrott, C.B.). Some of the buttons were of an ancient (probably eighteenth century) pattern. Besides the foregoing objects, a few bones of small rodents and birds and a number of limpet shells were found. The aspect of the fissure suggested that this was not the first time it had been excavated, though the lowest black earth and some at least of the mineralized bones were apparently *in situ*, so that earlier excavations had not been complete. After setting aside all the objects of interest, the fissure was again filled with the loose rubbish first removed from it.

The fissure just described is situated about ten feet west of the opening of Beefsteak Cave. Still further west, a considerable amount of scarping has been done in recent years. I examined the face of rock thus exposed for a considerable distance, but though small fissures occur, none are sufficiently large to deserve special notice.

(*c*) In the next place, the examination of the lower part of Glen Rocky was undertaken. This cleft is connected with the great fault which is traceable from Little Bay eastwards towards Windmill Hill Flats. The cave known as Judge's Cave is no doubt in communication with Glen Rocky, though I was unable to make out the connection. But Glen Rocky is probably connected with many fissures, in which the old bone breccia may be expected to occur. Three fissures were cleared

out on September 7th, but no bones of importance were obtained. The fissures and pockets observed are largely filled with fine mud deposited by storm-water from the roadways above.

(*d*) On September 8th a cave near the Buffadero Battery on Windmill Hill Flats was entered. This cave seems to correspond with Genista Cave No. 3 of Dr. Busk's classical report on Captain Brome's excavations (International Congress of Prehistoric Archæology; Norwich, 1868). The entrance resembles a well or shaft. At a depth of nearly twenty feet a floor is reached, and there are indications that the shaft continues to a greater depth. But the cave earth (if it existed) has been entirely removed, and progress is brought to a standstill by a number of large blocks of stone which seem to have been laid in position purposely. In view of the probability that this cave is Genista No. 3, and of the fact that if so it has been already explored by Captain Brome, I did not make arrangements to press the investigation further. The identity of the cave is not in my mind fully established, and if it be not Genista No. 3, further exploration might be profitably set on foot. I venture to add a note on the word "Buffadero," the significance of which, as applied to the neighbouring battery, is regarded by Colonel Kenyon, R.E., as doubtful (*cf.* Kenyon: "*Gibraltar*, under Moor, Spaniard and Briton," from the *Royal Engineers Journal*, 1911). Lyell, in his *Elements of Geology* (1st edition, 1832–33), mentions the "Buffadores" of Catalonia, stating that "Buffador is a term employed by the Spaniards to describe a hole in the ground out of which air rushes." If, as is probable, the well-like cave here near Buffadero Battery were not blocked by the large stones referred to above, it would have answered to this description, and it may have determined the name assigned to the battery.

(*e*) Attention was next turned to a small cave in the face of the cliff at the back of Governor's Cottage, or rather behind the stables attached to that residence. This cave is very like Cave 4 of Busk's report; it is close to that cave, but not identical with it. It is really *Cave* 4*a* shown in a sketch of Cave 4 (Plate V of Busk's report). But it is not mentioned by Busk, and therefore presumably it was not explored by Captain Brome. It will be referred to as Genista Cave 4*a*. Numbers of small bones of birds, fish, and rodents, and (of larger mammals) bones of an ibex were obtained from it.

(*f*) Genista Cave 4*a* was so small as to admit of complete excavation by September 9th, and on that day I resumed work in Sewell's Cave on the Mediterranean face of the Rock. This cave yielded a rich store of bones in 1910 (*cf.* Report, *loc. cit.*). In 1910 I failed to expose the floor in a particular region (marked "A" on the plan of the cave), and I was desirous to learn how deep the cave earth was in that part. All the earth was passed through sieves, so that the smallest bones might be recovered. On September 9th the following specimens of interest were obtained: 1 human tooth (the first and only one of its kind discovered throughout the exploration of Sewell's Cave), 1 tooth of a seal, and 1 unidentified tooth.

On September 11th, 12th, 13th, and 14th, the work of clearing out the deepest

fissures was pursued and completed. Incidentally I discovered a fissure in the upper part of the cave which had not been detected in 1910. But it contained neither cave-earth nor bones. From the cave-earth removed from other parts, the following bones and other objects were obtained: one small bone of the human hand, fitting a bone found in 1910 (this with the tooth just mentioned are the only human remains found in 1911); potsherds, stone splinters or implements, and various mammalian bones, including a single bone of the foot of a leopard. These objects will be mentioned again in the sequel. With regard to a bone bearing marks apparently made with some tool, I regret to say that my first opinion (expressed in the report sent to Colonel Grant, R.E., on November 24th, 1911), viz., that it presented human engraving is not borne out by my subsequent researches. I have examined most carefully the great numbers of splintered bones found in Sewell's Cave in 1910 and 1911, and I am now obliged to conclude that the markings in question really fall into line with a series of others leading to such as are clearly the marks of roots or rootlets.

I think that Sewell's Cave has now been completely explored, as the solid rock was reached in the area previously untouched.

(*g*) While working at Sewell's Cave I took the opportunity of climbing up to Holyboy's Cave, which is not far off. In that cave I found the hip bone of a small bear. The bone lay exposed on the cave floor.

(*h*) On September 11th Major Sewell took me to inspect some bone fragments which had been observed projecting from a mass of red clay filling a cleft in the wall of a gallery above the King's Lines. The bones prove to be part of the skeleton (limb-bones) of a large stag.

As I was fully engaged in Cave S at the time I did not make an attempt to examine this red clay any further.

(*i*) With Major Sewell I also visited the locality below the King's Lines where Professors Ramsay and Geikie suggested that bones might be found. In their report on the geology of the Rock, these authors described an old sea beach, and observed fossil mammalian bones in a matrix of rolled limestone pebbles beneath a brecciated talus of angular fragments at the Prince's Lines above the King's Lines.

No such bones are visible at present in the position indicated below the King's Lines.

II.

The objects obtained in the course of the excavations (enumerated in Section I) fall naturally into two divisions—

A. Objects of human manufacture.
B. Bones and shells.

A. The objects bearing evidence of human handiwork are from the fissure (b) near Beefsteak Cave, and from Sewell's Cave.

i. *Pottery.*—Potsherds were obtained from Sewell's Cave as in 1910. But in 1911 Mr. Storey (while assisting in the excavation) found a fragment with remains

of a definite pattern. Three other fragments were subsequently found, together with some fifteen pieces, which, like all those found in 1910, bore no marks of any kind. The fragments bearing a pattern are shown in Fig. 1: Nos. 1, 3, and 4 are marked with a simple device of nearly parallel rectilinear lines; No 2, on the other hand, is ornamented with a series of triangular pits. No. 1 is grey, No. 3 is red, while Nos. 2 and 4 are black. I have seen similar pottery in the museum at Granada. And again, their counterparts are easily found in the sherds described and figured in Dr. Busk's report, and indeed in collections of Neolithic pottery from many other localities (for other examples, *cf.* Cartailhac, *Ages préhistoriques de L'Espagne et du Portugal,* page 115, La grotte de Furninha, Péniche, Portugal; and Reinhardt, *Der Mensch zur Eiszeit in Europa,* pages 595 *et seq.*). Even this decorated ware is of the most lowly Neolithic type.

FIG. 1.—POTTERY (1, 2, 3, 4) AND SHELL ARMLET (5) FROM SEWELL'S CAVE, GIBRALTAR (1911).

FIG. 2.—PERFORATED FLAKES OF BONE FROM AN OSSIFEROUS FISSURE NEAR BEEFSTEAK CAVE, GIBRALTAR (1911).

ii. *Shell armlet.*—Sewell's Cave yielded in 1911 a second segment of a circular shell armlet, exactly fitting the fragment found in the same cave in 1910. The two fragments are shown conjoined in Fig. 1, No. 5. A complete ring figured by Cartailhac (*op. cit.*, page 64, Fig. 75) was found in the Cueva de la Mujer, Alhama de Granada, but it is not of the same type. It will be remembered that the armlet from Sewell's Cave is like one found in the Genista Cave No. 1.

iii. The ossiferous fissure near Beefsteak Cave yielded several pieces of bone from which small circular buttons have been punched or drilled out. They may be quite recent, but in view of the frequent mention of bone discs by Cartailhac in his review of Iberian cave-finds (*Ages préhistoriques,* etc.) I have thought it justifiable to submit a photograph (Fig. 2), in which the Gibraltar specimens are represented.

iv. Unworked stones were found in Sewell's Cave. They comprise three or four ovate rolled pebbles of large size and a few fragments of smaller pebbles which may have been split by fire.

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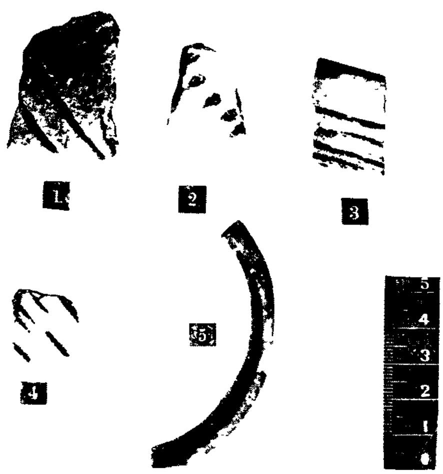

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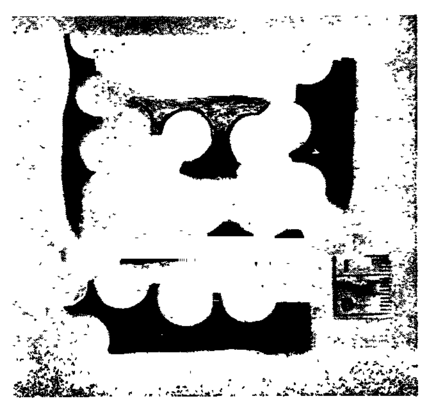

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iii. The ossiferous fissure near Beefsteak Cave yielded several pieces of bone from which small circular buttons have been punched or drilled out. They may be quite recent, but in view of the frequent mention of bone discs by Cartailhac in his review of Iberian cave-finds (*Ages préhistoriques*, etc.) I have thought it justifiable to submit a photograph (Fig. 2), in which the Gibraltar specimens are represented.

iv. Unworked stones were found in Sewell's Cave. They comprise three or four ovate rolled pebbles of large size and a few fragments of smaller pebbles which may have been split by fire.

fissures was pursued and completed. Incidentally I discovered a fissure in the upper part of the cave which had not been detected in 1910. But it contained neither cave-earth nor bones. From the cave-earth removed from other parts, the following bones and other objects were obtained: one small bone of the human hand, fitting a bone found in 1910 (this with the tooth just mentioned are the only human remains found in 1911); potsherds, stone splinters or implements, and various mammalian bones, including a single bone of the foot of a leopard. These objects will be mentioned again in the sequel. With regard to a bone bearing marks apparently made with some tool, I regret to say that my first opinion (expressed in the report sent to Colonel Grant, R.E., on November 24th, 1911), viz., that it presented human engraving is not borne out by my subsequent researches. I have examined most carefully the great numbers of splintered bones found in Sewell's Cave in 1910 and 1911, and I am now obliged to conclude that the markings in question really fall into line with a series of others leading to such as are clearly the marks of roots or rootlets.

I think that Sewell's Cave has now been completely explored, as the solid rock was reached in the area previously untouched.

(*g*) While working at Sewell's Cave I took the opportunity of climbing up to Holyboy's Cave, which is not far off. In that cave I found the hip bone of a small bear. The bone lay exposed on the cave floor.

(*h*) On September 11th Major Sewell took me to inspect some bone fragments which had been observed projecting from a mass of red clay filling a cleft in the wall of a gallery above the King's Lines. The bones prove to be part of the skeleton (limb-bones) of a large stag.

As I was fully engaged in Cave S at the time I did not make an attempt to examine this red clay any further.

(*i*) With Major Sewell I also visited the locality below the King's Lines where Professors Ramsay and Geikie suggested that bones might be found. In their report on the geology of the Rock, these authors described an old sea beach, and observed fossil mammalian bones in a matrix of rolled limestone pebbles beneath a brecciated talus of angular fragments at the Prince's Lines above the King's Lines.

No such bones are visible at present in the position indicated below the King's Lines.

II.

The objects obtained in the course of the excavations (enumerated in Section I) fall naturally into two divisions—

A. Objects of human manufacture.

B. Bones and shells.

A. The objects bearing evidence of human handiwork are from the fissure (*b*) *near Beefsteak Cave, and from Sewell's Cave.*

i. *Pottery.*—Potsherds were obtained from Sewell's Cave as in 1910. But in 1911 Mr. Storey (while assisting in the excavation) found a fragment with remains

of a definite pattern. Three other fragments were subsequently found, together with some fifteen pieces, which, like all those found in 1910, bore no marks of any kind. The fragments bearing a pattern are shown in Fig. 1: Nos. 1, 3, and 4 are marked with a simple device of nearly parallel rectilinear lines; No 2, on the other hand, is ornamented with a series of triangular pits. No. 1 is grey, No. 3 is red, while Nos. 2 and 4 are black. I have seen similar pottery in the museum at Granada. And again, their counterparts are easily found in the sherds described and figured in Dr. Busk's report, and indeed in collections of Neolithic pottery from many other localities (for other examples, *cf.* Cartailhac, *Ages préhistoriques de L'Espagne et du Portugal*, page 115, La grotte de Furninha, Péniche, Portugal; and Reinhardt, *Der Mensch zur Eiszeit in Europa*, pages 595 *et seq.*). Even this decorated ware is of the most lowly Neolithic type.

FIG. 1.—POTTERY (1, 2, 3, 4) AND SHELL ARMLET (5) FROM SEWELL'S CAVE, GIBRALTAR (1911).

FIG. 2.—PERFORATED FLAKES OF BONE FROM AN OSSIFEROUS FISSURE NEAR BEEFSTEAK CAVE, GIBRALTAR (1911).

ii. *Shell armlet.*—Sewell's Cave yielded in 1911 a second segment of a circular shell armlet, exactly fitting the fragment found in the same cave in 1910. The two fragments are shown conjoined in Fig. 1, No. 5. A complete ring figured by Cartailhac (*op. cit.*, page 64, Fig. 75) was found in the Cueva de la Mujer, Alhama de Granada, but it is not of the same type. It will be remembered that the armlet from Sewell's Cave is like one found in the Genista Cave No. 1.

iii. The ossiferous fissure near Beefsteak Cave yielded several pieces of bone from which small circular buttons have been punched or drilled out. They may be quite recent, but in view of the frequent mention of bone discs by Cartailhac in his review of Iberian cave-finds (*Ages préhistoriques*, etc.) I have thought it justifiable to submit a photograph (Fig. 2), in which the Gibraltar specimens are represented.

iv. Unworked stones were found in Sewell's Cave. They comprise three or four ovate rolled pebbles of large size and a few fragments of smaller pebbles which may have been split by fire.

v. *Worked stones.*—These again are from Sewell's Cave only. Mention must be made first of a curious slab of rough sandstone, which may have formed part of some kind of quern or hand-mill. Sandstone querns are mentioned by Busk (*op. cit.*), but not described in detail.

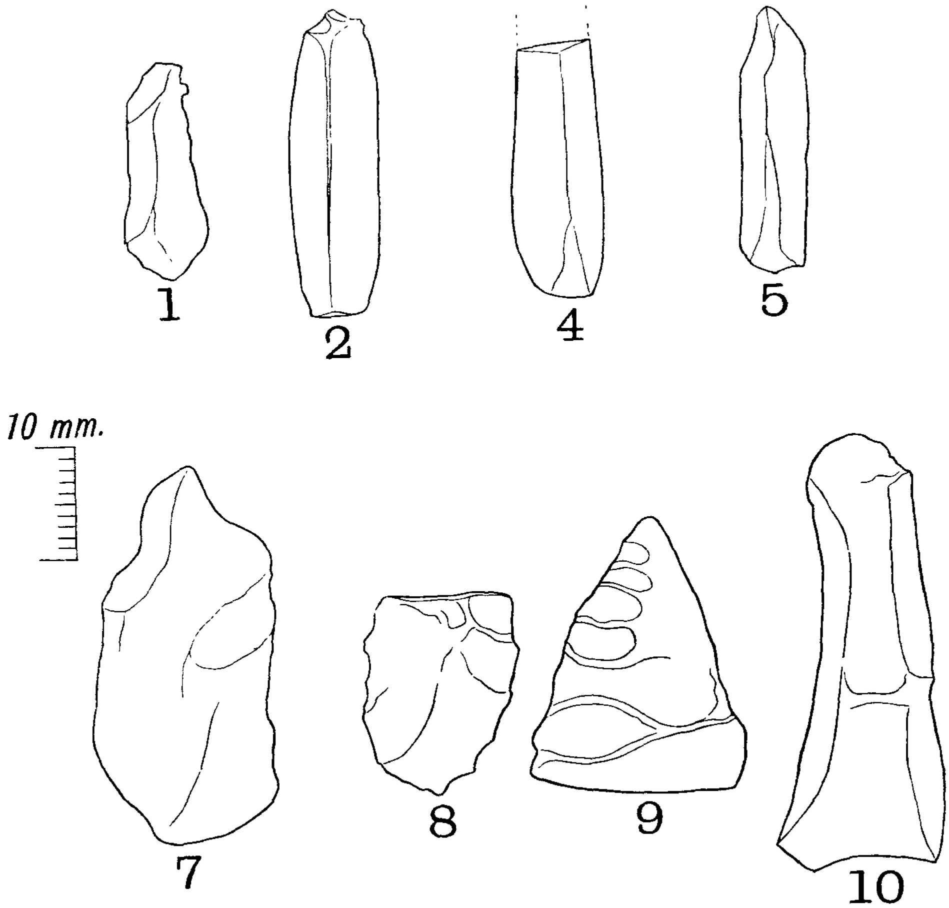


FIG. 3.

Other worked stones are represented in Figs. 3 and 4, and will be described here in reference to the numbers appended to them in those illustrations. In Fig. 3 all the implements are of chert or flint, Nos. 1, 2, 4, 5, being very delicate flattish flakes similar to a fine flint flake found (in Sewell's Cave) in 1910. They look more like graving tools or fine borers than arrow-heads. No. 7 is a chert implement with a point suggestive of a Magdalenian "bec-de-perroquet." No. 10 is a larger flake, probably a scraper. No. 9 is like the end of a Solutrean knife-blade. In Fig. 4, No. 19 is very remarkable. It is a large quartzite plate of Mousterian form with one definitely serrated margin. Of the remainder, No. 7 may be a borer, No. 9 is clearly a scraper, and No. 13 may be an unfinished arrow-head. But on the whole these flakes repeat the characters noticed in the 1910 finds, and even those of Mousterian form must, in my opinion, be attributed to a Neolithic culture.

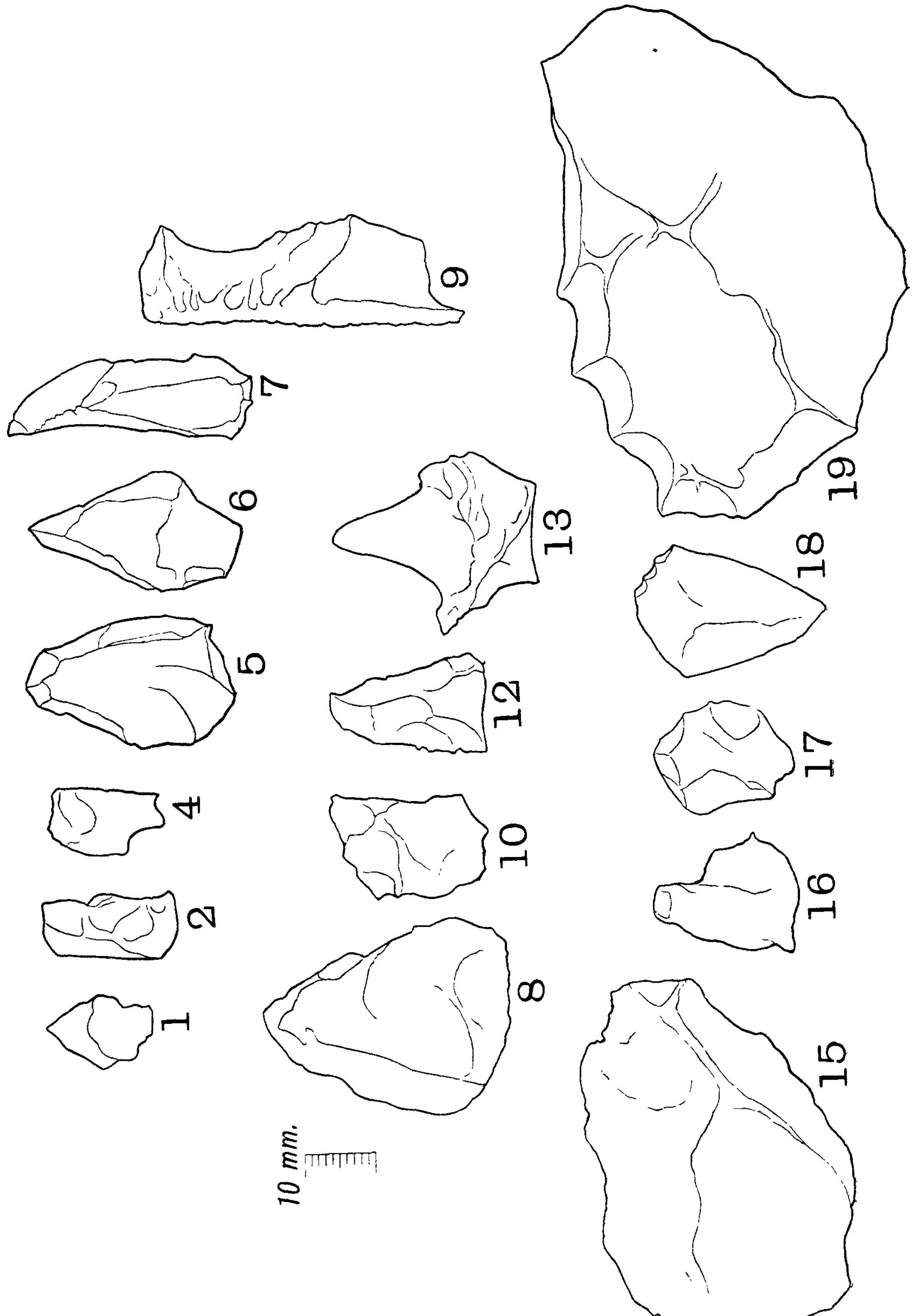


FIG. 4.

II.—B. *Bones and Shells.*

In connection with this part of the report, I wish to express my thanks to Mr. Hinton who has very kindly examined the remains of the smaller rodents and has sent some remarks with his identifications. These are marked by the letters M.A.C.H., and the full report will be added later (*vide* Appendix).

In dealing with the animal remains, the plan has been adopted of taking the several sites in succession and giving in each case a list of the animals as identified by their skeletal remains. In the case of Sewell's Cave (Cave S.) the list embodies that of 1910, which is now somewhat extended.

I. *Ossiferous fissure near Beefsteak Cave.*—

Ungulata	*Cervus elaphus*, probably from an ancient breccia.
	Bos taurus (ox), probably recent.
	Capra hircus (goat), probably recent.
Rodentia	*Oryctolagus cuniculus* (rabbit), probably recent.
	Mus rattus (M.A.C.H.).
	Epimys norvegicus (M.A.C.H.).
Aves...	*Falco tinnunculus* (kestrel).
	Larus, species ? (or *Lestris*), (gull or skua).
	Uria troile (guillemot).
Invertebrata ...	*Patella*, two species (limpet).
	Turritella, species ?
	Helicella, species ?

II. *Glen Rocky Fissures.*—Bones all recent. Animals represented are *Canis fam.* (dog), and *Carduelis* (goldfinch). A very long slender wing-bone of anserine form, may be that of a flamingo.

III. *Genista Cave*, 4A.—

Carnivora	*Felis catus*, recent.
Ungulata	*Capra ibex*.
	Capra hircus.
	Bos taurus, recent.
Rodentia	*Mus epimys rattus* (M.A.C.H.).
	Epimys norvegicus, probably *sylvaticus* (M.A.C.H.).
Aves...	*Phasianus* (pheasant).
	Columba livia (rock-dove).
	Fratercula arctica (puffin, *not* shearwater).
	Colymbus, species ? (diver).
Pisces	*Perca*, species ? (perch).
	Chrysophrys aurata (still found locally).

IV. *Sewell's Cave* (*Cave S.*)—

Mammalia.—

Primates ...	*Homo sapiens* (1911, *os lunare carpi*, and a right lower canine tooth).
Carnivora ...	*F. pardus* (leopard, 1911).
	F. lynx (lynx).
	F. catus (cat, 1911).
	C. lupus (wolf).
	C. vulpes (fox).
	Monachus mediterraneus (hooded seal).
Ungulata ...	*Capra ibex* (ibex).
	C. hircus (goat).
	Rupicapra tragus (chamois).
	Ovis aries (sheep).
	Bos taurus.
	Sus scrofa.
Rodentia ...	*Lepus timidus* (hare, 1911).
	Oryctolagus cuniculus (M.A.C.H.).
	Eliomys lusitanicus (M.A.C.H.).
	Arvicola sapidus (M.A.C.H.).
	Pitymys ibericus (M.A.C.H.).
	Apodemus sylvaticus dicrurus (M.A.C.H.).
	Epimys norvegicus (M.A.C.H.).
	Mus spicilegus hispanicus (M.A.C.H.).
	Mus sylvaticus.
Insectivora	*Sorex*, species ? *araneus granareus.*
Cheiroptera	*Vespertilio*, species ?
Aves	*Vultur fulvus* (griffon vulture).
	Aquila, species ? (sea-eagle, 1911).
	Falco tinnunculus (kestrel).
	Corvus corax (raven, 1911).
	Corvus corone (crow, 1911).
	Pyrrhocorax, species ? (chough).
	Pica caudata (magpie, 1911).
	Turdus viscivorus (missel-thrush, 1911).
	Turdus merula (blackbird).
	Tetrao francolinus (francolin).
	Columba livia (rock-dove).
	Sula alba (gannet).
	Phalacrocorax carbo (cormorant).
	Fratercula arctica (puffin).
	Colymbus, species ? (diver, 1911).

Reptilia	*Monitor* (? *niloticus*).
	Testudo, species ?
	Gecko mauritanica (gecko).
Pisces	*Thynnus thynnus* (tunny).
	Pagrus, species ? (pagre, sea-bream).
	Chrysophrys aurata (1911).
Invertebrates.—	
A. *Mollusca* ...	*Purpura hæmastoma* (three more curiously fractured specimens were found in 1911 (*cf.* Report, *Journ. of the Roy. Anthrop. Inst.*, vol. xli, Plate XL)).
	Purpura lapillus.
	Trochus tessellatus.
	Cardium rusticum.
	Cardium, species ?
	Solen vagina.
	Patella, species ?
	Pecten marinus.
	Mytilus edulis.
	Triton nodiferus.
	Cypræa pyrum.
	Cassis sulcosa.
	Nassa reticulata (1911).
	Helix (various species).
B. *Echinodermata* ...	*Sphærechinus granularis.*
V. *Holyboy's Cave* ...	*Ursus*, species ? (a small bear, 1911).
VI. *Kings' Lines Galleries*	*Cervus elaphus* (a small form, 1911).

REVIEW of IIB.—(*Bones and Shells.*)

(*a*) In reviewing the lists of animal forms, the most evident conclusion will be to the effect that save in one instance the fauna is still the "prehistoric," as contrasted with that commonly described as the Quaternary fauna. The exception is a single bone referable to the leopard, and found in the deepest part of Sewell's Cave. In appearance the bone differs from the majority of the other bones from that cave. I do not feel confident that it represents an earlier and distinct horizon, though this conclusion would be naturally drawn from its presence. But Genista Cave No. 1. (*cf.* Busk, *op. cit.*) also yielded remains of the leopard, and, moreover, in a very fragmentary condition. Otherwise the occurrence of this feline form certainly denotes great antiquity. For it ranges from the Cromer Forest Bed (*cf.* Newton, *Memoirs of the Geological Survey*) and the strata at Dénise in Auvergne (*cf.* *L'Anthropologie*, 1906, page 398) down to the Cave period in Britain. Apart

from this remarkable exception, the facies of the cave fauna here described is distinctly "prehistoric"; and even the additions made by Mr. Hinton to the list of rodents do not modify this conclusion, for although *Pitymys* is no longer a British genus, yet it is still characteristically South European.

With regard to the shrew (*Sorex*) recorded in my earlier report, I may remark that it was obtained in September, 1910. In November of that year Mr. Miller published another record, said to be the first announcement of the occurrence of this insectivore in the Iberian peninsula.

(*b*) A point meriting some notice is the conspicuous absence of any remains of *Cervidæ* from Sewell's Cave. It is perhaps more noteworthy in connection with the complete absence of bone implements from that cave. Of the cervine remains found (at the fissure near Beefsteak Cave, and near the King's Lines), some are small. But they are too fragmentary to enable me to refer them with confidence to the fallow deer (a southern form), in view of the well-known variability of the red deer (*C. elaphus*).

(*c*) The excavation of 1911 has added a species of *Nassa* to the list of molluscs found in Sewell's Cave. *Nassa* is frequently found in prehistoric sites, often in great numbers, as in the case of the excavation at Aurignac, which yielded the now well-known *Homo aurignacensis hauseri*. The single specimen found in Sewell's Cave was probably introduced by man, but its range in time is too great to enable me to affix a particular date to that event.

III. GENERAL SUMMARY.

An attempt to survey the ground now covered may be made at this stage.

With regard to actual remains of man, the work of 1911 has added little of importance to that of 1910. I may remark, however, that the skeleton then found, although it is imperfect, has yet a good deal to teach us on the subject of the human type it represented. My friend and former pupil, Mr. Appleton, of Downing College, has kindly undertaken a detailed investigation of the bones of the foot, and his conclusions are to be published in a separate memoir. With regard to other bones, the recently-published investigations of Professor Mayet (*cf. L'Anthropologie*, 1912, Janvier–Février) provide valuable material (in the form of Neolithic tibiæ) for comparisons, which I hope to commence at once. Yet the subject of our investigations will still be the Neolithic, not the Palæolithic inhabitant of the Rock. Since my first report was read I have been confirmed in my view that the implements from Sewell's Cave include Mousterian, Aurignacian, Solutréan, and even Magdalenian forms, yet I do not think that this evidence is sufficient to enable me to regard the human skeleton as Palæolithic. Evidence as to the Palæolithic man of Gibraltar is thus the same as before. My endeavours to trace the human skeleton alleged to have been found at a great depth and in the rock near Camp Bay have proved fruitless so far. But I see no reason for abandoning the quest on that account.

With regard to the objects manufactured or shaped by man, I do not find anything to add to the remarks already made (in an earlier part of this report) on the pottery. But I may be allowed to make one or two observations in regard to the Gibraltar implements. In the first place, I have seen very similar flakes from the Cueva de la Mujer near Alhama de Granada, now preserved in the museum at Granada. In the National Museum at Madrid I saw flint flakes of similar form from the Cueva de los Murcielagos (near Granada), though they are larger than those from Gibraltar and those from the Cueva de la Mujer. But across the Straits such implements as those figured in this report (Figs. 3 and 4) seem to abound, and I think it would not be difficult to link these Gibraltar finds to others, forming a zone extending from Andalusia far southwards, perhaps to the Sénégal, and eastwards to the Nile. For several suggestive memoirs on this part of the subject, I would refer to *L'Anthropologie*, vol. xviii, 1907, where M. Pallary in particular gives a most valuable summary of the evidence now available for Ceuta, Tetuan and other localities in Morocco. Moreover it is to be noted that while the Neolithic facies of the culture is distinctly recognised, the occasional occurrence of Mousterian forms is undoubted. The larger forms even include quartzite implements of almost Chellean type, as for instance near Rabat. The presence of implements there, with great collections of mussel shells, is very suggestive of the conditions in Sewell's Cave. On the other hand, in none of the localities cited either in Spain or Africa do I find accounts of anything resembling the magnificent neoliths of the Casa da Moura in Portugal (Cartailhac, *op. cit.*, p. 87).

M. Gautier (also in *L'Anthropologie*, 1907) takes a wider area, including the whole of Africa north of the Sahara, and his conclusions are most valuable in connection with those of M. Pallary, though their consideration is reserved for a later report. Even these do not exhaust the stores of information contained in the particular volume referred to, though they will serve to indicate the nature of the publications.

In conclusion, I must repeat that not the least extraordinary feature of the excavations carried out so far is the entire absence of bone implements from Sewell's Cave. This defect, and the inaccessibility of the cave, would seem to indicate that it was not inhabited by any large number of persons nor during any great lapse of time. In my earlier report (1910) I commented upon some metatarsal bones curiously worn as though abraded by use as burnishers. But I have since learned by observation that the young metatarsal bone of a lamb (or kid) naturally splits when exposed to the weather, and in splitting leaves exactly such a surface as that referred to. Those specimens are therefore to be ruled out of the list of implements.

APPENDIX.

NOTE ON THE RODENTS FROM THE GIBRALTAR CAVES COLLECTED BY DR. W. L. H. DUCKWORTH (1910–1911).

BY MARTIN A. C. HINTON.

The following is a list of the small mammals—all rodents—represented in the collections made by Dr. Duckworth from the Gibraltar Caves and a brief account of the materials upon which my determinations are based.

(1) *Oryctolagus cuniculus*, Linn. A mandible (right and left ramus) of a young individual; the presence of five cheek-teeth and the situation of the large mental foramen in front of the anterior premolar prove that we are dealing with the rabbit and not with *Prolagus*, which inhabited the rock during Pleistocene times. (Cave S, Gibraltar.)

(2) *Eliomys lusitanicus*, Reuvens. Three right maxillæ (one without teeth, one with *p.* 1, and one with *d.* 1 and *m.* 1 in place) and three right mandibular rami without teeth; the size, form, and dental characters agree perfectly with *E. lusitanicus.* Length of upper cheek-teeth (alveoli), 5·8 mm.; of lower cheek-teeth, 5·9 mm.; of mandible, 19–20 mm. (Cave S, Gibraltar.)

(3) *Arvicola sapidus*, Miller. Anterior part of a young skull (the temporal ridges 3·2 mm. apart in the interorbital region); it agrees in size with the skull of equal aged *A. amphibius*, but differs in the great breadth of the nasals, which anteriorly are nearly as wide as the rostrum; clearly referable to *A. sapidus.* (Cave S, Gibraltar.)

(4) *Pitymys ibericus*, Gerbe. Anterior part of a skull with incisors, but wanting the molars, and one right and left mandibular rami (*dm.* 1, present in one, last molar, *m.* 2 in another, but otherwise without cheek-teeth); *dm.* 1 with the characteristic pattern of the genus, viz., a posterior loop, three closed triangles, a broadly confluent pair and an anterior loop; the skull and mandible agree in size and general form with *P. ibericus;* the upper incisors are, however, still more straightened and protruding, and the rostrum is more depressed—its least depth behind incisors being slightly less than the anterior rostral breadth; in the latter feature it is more like the smaller *P. depressus*, Miller, from Central Spain. Measurements:—Interorbital constriction, 4 mm.; nasals 7 mm.; diasteme, 8 mm. (Cave S, Gibraltar.)

(5) *Apodemus sylvaticus dichrurus*, Rafinesque. Anterior parts of two skulls (one with all, the other with right molars only), three right and two left maxillæ, and six or seven mandibular rami. In size, form, and dental characters these remains agree perfectly with the Mediterranean *A. sylvaticus dichrurus*; length of cheek-teeth (upper and lower), 4–4·5 mm. (Cave S, Gibraltar.)

(6) *Epimys norvegicus*, Erxleben. ("*M. decumanus*") skull of an old animal with much-worn molars and wanting the occiput (from "Genista" Cave); a right mandibular ramus of an old animal and the right premaxilla and maxilla with all the teeth, together with the mandible of a young individual (from the fissure near the "Beefsteak Cave"); the large size, cranial and dental characters prove these remains to be referable to *E. norvegicus* and not to *E. rattus*. Measurements:—Nasal tips to posterior margin of interparietal, 46·8 mm.; interorbital constriction, 7 mm.; nasals, 18·3 mm.; diasteme, 14·2 mm.; molars, 7·6 mm.; mandible, 30·5 mm.; lower molars, 7·1 mm.

(7) *Mus spicilegus hispanicus*, Miller. Parts of two skulls and six mandibular rami with cheek-teeth belong to the genus *Mus* and cannot be differentiated from this form. Length of mandible, 11·8 mm.; of molars, 3·2 mm. (Cave S, Gibraltar.)

All the bones before me, obtained by Dr. Duckworth, have a recent appearance, and all belong to forms which, if not yet known to inhabit Gibraltar, are at all events still living in southern Spain. The bones of *Epimys norvegicus* must certainly be looked upon as modern; those of the other species may be of some considerable antiquity.

SOME TECHNOLOGICAL NOTES FROM THE POMEROON DISTRICT, BRITISH GUIANA. (PART IV.)

BY DR. WALTER E. ROTH, Local Correspondent of the Royal Anthropological Institute.

[WITH PLATES XXXVII–LXV.]

IN this article I propose dealing with the remaining close-work basketry, to which the prepared *iteriti* (*Ischnosiphon*) strands so readily adapt themselves.

1. CONCAVE CIRCULAR TRAYS. (Plates XXXVII–XXXIX.)

The *ite* (*Mauritia*)-flour sifter of the Warrau is a very good example of a concave circular tray. Starting with two strands placed at right angles, a square mat of from 18 to 22 inches in width, exclusive of the free ends of the strands projecting to a distance of another 8 or 10 inches, is finally completed, a common pattern depicted being a series of concentric squares (Fig. 1) having their diagonals at right angles to the sides of the mat. It will be observed that the plait consists of one strand being passed alternately over and under three. The two commencing strands, where they reach the sides, may be finally tucked back and upon themselves, for strengthening purposes only. Certain of the strands, to intensify the pattern, may be stained black, even when the article is intended for domestic use, *i.e.*, not for sale or barter. Two thin wooden hoops (*a*, *b*) are next prepared, having a diameter somewhat less than the width of the mat which, after being placed between the two and carefully "dumped" in the centre to give the necessary concavity, is then tied on to both of them in eight places at equal intervals. This tying, which serves but a temporary purpose, is done with a piece of *itiriti* strand, for which a passage is made where required with a deer-horn piercer. Each of the four corners of the square projecting beyond the hoops is now thinned (Fig. 2) just around the circle by cutting away all the horizontal strands in the one half of each quadrant, and all the vertical strands in the other half. The next thing is to take an extra long piece of *mamuri* (bush-rope) (*f*), and overcast the whole edge (both of the hoops and intervening mat included) at intervals of about five or six strands at a time (Fig. 3), the *mamuri* being inserted fairly loosely at first. Each such set of five or six strands is together twisted tightly into a bundle (*g*) which is laid *over* the next coil of *mamuri*, but *under* the succeeding one (so as to lie in the furrow between the loops), at the same time that the overcasting piece of *mamuri* strand is tightened up, bit by bit, with the object of fixing and keeping the

twisted bundle in place. Finally (Fig. 4) a second strand of *mamuri* (*h*) is passed successively *under* each coil of the overcast portion and *over* the intermediate twisted bundles of *itiriti*. The reason for making this edging so strong is to guard against the pressure of the operator's hand when sifting the flour through. A small overcast loop, wherewith to hang up the article when not in use, is often attached (Plate LXV, Fig. 12). Owing to the interspaces between the individual plaits being so small, this form of sifter can be, and is certainly, used as an actual tray for carrying purposes; on the other hand, it must be remembered that the flour of the *ite* palm is far finer than the ordinary domestic variety met with in European households.

A similarly shaped receptacle (Fig. 5), but with a different edging, is used by the Akawaio as a tray for collecting the cassava that has been pressed through the square sifter (Plate XLI) placed across on top of it: its construction would not withstand the strain of being used as a sifter itself. The edging (*m*) is made on the same lines as the collar band of the cassava-squeezer described in a previous article (Part I, Plate XXXVIII, Fig. 4). As soon as it has reached the requisite length it is folded lengthwise, and the margin of the mat, cut away circularly, laid between its folds, the next process consisting of plaiting its free ends into one another, so as to make a continuous ring of it. By tying on finally two hoops (*a*), in the manner previously indicated, the edging becomes permanently fixed. All this is of much simpler execution than the stronger Warrau method, and hence, in the smaller circular concave trays designed in various patterns for the Creole market, and manufactured for it by individuals of both those nations, this simpler form is adopted. Certain of these designs are shown in Plates XXXVIII and XXXIX. Plate XXXVIII, Fig. 1, is the "diamond-snake" pattern, Fig. 2 represents the tracks in the mud of a small edible mollusc, the meaning of Fig. 3 has been lost, while Fig. 4 is spoken of as a "monkey-skull," though admittedly hard to recognize. Plate XXXIX: no interpretations of the patterns represented in Figs. 1 and 3 were forthcoming, but Fig. 2 indicates a "cassava-cake," and shows the four quarters into which such a cake is usually cut.

2. SQUARE MATS. (Plate XL.)

The Caribs manufacture square mats (Fig. 1) on which to place the cassava cakes when ready to be taken from off the fire. These are commenced like the squares (Plate XXXVII, Fig. 1) ultimately forming the Warrau *ite*-sifters, resembling them both in size and plait—as well as in the manner in which the free ends of the strands are allowed to project—but not in workmanship or closeness of texture: the *itiriti* strands are usually irregular, and not split according to what I have described as the orthodox method. Taking up two of these projecting strands at a time (Plate XL, Fig. 1, *ab*), these are wound twice over a rail (*w*) and then passed across themselves to be plaited respectively under and over the two immediately preceding vertical pairs of strands (*cd*, *ef*), finally to be tucked under the

extremities of the pair next emerging (*cd*) from under the rail. This rail is a single length of *mamuri* vine-rope running round the whole margin of the square, the intervening distance being always considerable.

The Akawaio employ for the same purpose a square mat with an edging raised to but a slighter degree more than that used by the Caribs. The square itself (Fig. 2) is commenced with one set of three strands (*m*), being plaited into another set of three (*n*) in such a manner that one strand alternately crosses over and under one other: the remainder of the square is completed by alternately crossing one strand over and under two others. The edging (Fig. 3) is formed of a single rail (*w*), like that of the Carib cassava mat just described, but lies very close to the body of the article. Taking two projecting strands (*ab*) at a time, these are together rolled once over the rail and emerge from underneath it (*cd*): they are next "broken," *i.e.*, sharply-bent upwards (*ef*), and passed respectively over and under the two next emergent pairs to be finally "broken" downwards (*kl*) and plaited respectively under, over, and again under the next three pairs (*op*), behind the last one of which they are cut. The outcome of this technique is that the two margins of the strands, where "broken," form two sharp ridges which, in practice, are drawn very close together, an arrangement which cannot be very well represented in a diagram.

3. Square Cassava Sifters. (Plate XLI.)

Arawak and Warrau make two varieties of sifter—one for their own personal use, another for sale and barter—the difference lying in the manner in which the edging is completed, the process of manufacture of the main body being otherwise identical. *Itiriti* strands, as is the case with all and every kind of close-work basketry, are the ones employed (Fig. 1), one set of three (*m*) being plaited into another set of three (*n*) placed at right angles, to form a foundation upon which the resulting square body, about 18 inches diameter, is plaited. As will be recognized from the illustration, the manner in which the two commencing treble sets are arranged—different from that observed in the square cassava mat of the Akawaios (Plate XL, Fig. 2)—allows for the comparatively large interspaces between the other strands as they are successively inserted. The plaiting of these latter resembles that of the Akawaio mat, in that one strand alternately passes over and under two others. Along all four edges of the completed square the free ends of the strands project about another 12 inches. Two sticks or rails (Plate XLI, Fig. 2, *w w*) are now placed across the bases of the projecting strands so as to lie parallel with the edge of the square, the outer rail being about 3 inches distant from it. In the variety of sifter reserved for domestic requirements, which is but naturally the stronger and better of the two, the edging is completed as follows: starting at a corner from right to left, the projecting strands are taken up two at a time (*ab*), rolled twice over the outside rail, then passed behind themselves and over the inside rail, to be finally again tucked behind themselves, and now looped so that their free extremities (*gg*)

lie on top. The same process is repeated with the second pair of strands, and so on, the free ends left over from the previous ones being always included in the lower loop; of course, the bundle composed of these free ends becomes too wieldy after a time, when it will be appropriately thinned by cutting away as many as may be necessary. Upon completion of one side of the square, the next is treated in similar fashion (Fig. 3), the bundle of free ends remaining from the former being included in the lower loops of the latter. All four sides are thus similarly dealt with. In the variety of sifter (Fig. 4) manufactured for purposes of sale, etc., there is no looping below the inside rail, but the two free ends (*gg*) of the projecting strands are together passed from behind over and under the two immediately succeeding pairs. The free ends of the next pair of strands (*cd*) emerge just below these, and the next (*ef*) below these again, and so on, the intervening space between the edge of the plaited square and the inside rail being just a little greater than the combined width of three strands. The free extremities still left projecting (Fig. 5) are now bent or "broken," plaited one-over-and-under-two between themselves (*kk*), and finally trimmed. With both varieties, the article is now taken from off the flat, the position in which so far it has been plaited, and folded along each diagonal whereby the contiguous pairs of rails are locked, and where they are subsequently fixed by tying (Fig. 6), the original square mat being thus converted into a sifter with a firmly raised specially constructed border.

4. SQUARE TRAYS. (Plate XLII.)

For collecting the cassava flour after it has passed the sifter.

The true cassava trays of all four nations (Arawak, Warrau, Carib, and Akawaio) are from 12 to 22 inches and upwards square, and plaited in the ordinary one-over-and-under-three style in a simple manner, *i.e.*, without any central treble sets of strands. The pattern is usually the diamond-snake (Fig. 6), but is also often met with in the "Greek Key" pattern style and its variations. The edging is composed of a series of continuous rails plaited together in the form of a vertical lamina at right angles to the body surface of the tray, and of equal depth above and below it (Fig. 4). From six (Fig. 1) to ten rails of split cane are used in its construction. Taking up two at a time (*ab, cd, ef*) of the strands projecting from the square, these are together passed upwards over, under, and again over the upper rails (*h, i, k*) respectively, whence they are plaited in the reverse direction to the spot under the first rail (*h*) to the *right* of whence they started. This process is repeated all the way round the square, and when the upper half of the lamina is thus completed, a similar procedure is put into execution to constitute what will ultimately become the lower half. The result is that the free ends of the projecting strands come to lie exactly over their own points of origin (from the edge of the square) just above which they are cut. This arrangement will perhaps be made clearer in the diagrammatic vertical section (of the same Fig.). The upper and lower margins of the edging are next strengthened by two (Fig. 2), sometimes three (Fig. 3) slips

of split cane fixed in various ways with strips of *mamuri*, while in the larger trays the corners may be further supported by ties fixed across the inside. And lastly, it sometimes happens that one sees legs (*l*) attached (Fig. 5) at the corners, but in such cases the tray is then generally retained for keeping the cassava cakes when made (Plate XXIX, Fig. 8).

5. Conical Baskets. (Plate LXV, Fig. 3.)

This basket is but rarely used now, the six or seven examples that I met with being in the possession of the older folk and "doctors." Employed as a strainer, the Arawak used it in the manufacture of black *paiwarri* (not with other drinks) and called it *kamai-yo*. Owing to its conical-shaped base it has no present-day utility, as a receptacle for storing articles, without the suspending string attached to opposite sides of its upper circular edge.

The manufacture is comparatively simple. Operations are commenced by making a square mat (Plate XLIII, Fig. 1), the plaiting of which consists in the repetition of passing a single horizontal strand (*a*) over and under a set of three vertically arranged ones (*b*). Once the square, which varies with the depth of basket required, is completed, a special strand (*s*) is passed in similar fashion around two contiguous sides, the point of contiguity ultimately forming the conical extremity (*c*) of the finished article. The next procedure is to plait together the projecting strands of these contiguous sides in the same way, *i.e.*, one under and over three (Fig. 2), throughout their whole extent. When the further corners (*d, e*) are reached the lower conical portion (*dce*) of the basket is completed, its upper circular portion (*gh*) being finally brought into existence by plaiting the strands projecting from the lower area just manufactured with the strands projecting from the two sides (*df, ef*), which were originally left free by the special strand (*s*). The upper circular portion of the basket may be extended at discretion.

6. Pegalls. (Plate LXV, Fig. 7.)

These consist of two similarly-plaited deep-edged trays, one slightly larger than the other, so that the former, when inverted, will act as cover to the latter: they thus together constitute something very much after the style of a lady's dress basket. According to their mode of construction, there is a sharp division of these articles into two groups, which, in view of the patterns represented, may be described as the "armadillo" and the "hour-glass." The former is the name applied by the Indians; the latter has been chosen by myself in the absence of any native term, as well as for reasons which will subsequently be given. An unusual shape of hour-glass pattern Pegall is that specially employed by the "doctors" alone, and shown in Fig. 5.

The Armadillo Pegall (Plate XLIII, Fig. 3) is commenced as a rectangular mat made up of horizontal sets of double strands (*a, a*), distant a strand's breadth (*c*)

from one another, plaited over and under vertical strands (*b b*) in close apposition. Indians recognize a likeness in this arrangement with the markings on an armadillo shell. The required size having been reached, the projecting ends are folded over in pairs (Fig. 4, *ab*), while the sides are gradually built up by passing a new strand (*s*) one at a time, successively over and under each pair, the extremities of each new strand being tucked one below the other. The depth of the sides will thus depend upon the number of new strands superimposed. It should be noted that while the projecting strands on the longer sides of the cover are already in pairs (*a*, *a*) those on the shorter sides (*b*, *b*) are obtained by taking them up in bundles of four, and then cutting the first and third of each bundle short.

The "Hour-glass" Pegall (Plate XLIV, Figs. 1 to 6: Plate XLV). The plait is started with from six to eight strands arranged at their centres in such a way as to form two triangles (*a*, *a*) attached at their apices, together resembling a figure which may legitimately be likened to an hour-glass, whence I have named the pattern: this arrangement, with uncoloured strands, is shown in Plate XLIV, Fig. 2. But where one series of the strands is coloured black (or red) but half its length (Fig. 1) the resulting pattern shows coloured (Figs. 3, 5) or plain (Fig. 4) hour-glasses, with plain or coloured backgrounds respectively. On the other hand, if the series is stained throughout, the result is depicted in Fig. 6, a pattern of coloration specially practised on occasion by Warrau. Upon the number of these hour-glasses will depend the length, as compared with the breadth, of the finished article. When once these figures are completed, the free ends of the projecting strands are plaited throughout in the ordinary way of one under and over three others so as to form the cover top exhibiting a pattern of concentric rectangular figures (*b*, *b*)—the well-known "herring-bone" arrangement of technologists —which in the larger pegalls may be broken up and subdivided (Plate XLV, Figs. 1, 2, 3). The cover-top completed, a start is made with any one of its corners (Fig. 4*c*), where the projecting strands of the two contiguous edges are folded sharply over and plaited in the usual manner (one under and over three) into one another, to build up the sides which invariably commence with two or more rows of herring-bones. These rows (*b*) are easily distinguishable in Plate XLVI, which represent all the Pomeroon District patterns employed on the sides of the pegalls where uncoloured strands are used. Where only one hour-glass is plaited (Plate XLV, Fig. 4), the resulting cover-top is a square and the completed pegall derived from it, more or less round, a shape specially favoured by the Akawaio (Plate LXV, Fig. 4): further developments of this round form of pegall is the child's rattle (Plate LX, Figs. 4, 5) and the pitcher-shaped basket (Plate LXI, Fig. 1). Names are not usually applied to the patterns on the uncoloured pegalls, although certain of them are identical in construction with those met with in the stained specimens and in the cassava-squeezers. On the other hand, with the use of colour, while the cover tops of the pegalls are all more or less identical (Plate XLV), the artificer will exercise his skill and ingenuity in depicting various patterns upon the sides, adding as often as not certain decorative borders (*k*) above and below. These

patterns, my informants tell me, are handed down from father to son, and it is certainly remarkable that, in the absence of any working model, these Indians will execute so many and such varied designs with so much accuracy. One old Warrau friend of mine can plait more than a score of different patterns.

The following objects are to be found illustrated on the side panels of these coloured pegalls, but since many of them are common with the pictographs on the satchels to be next described, I am including those of the latter in my inventory :—

Among plants there is the wild nutmeg (*Myristica* sp.), the "darli" tree of the Arawak and Warrau (Plate XLVII), indicated by its main (*a*) and secondary (*b*) branches, which certainly possesses a characteristic appearance among other forest trees. This, coupled with the facts that its fruit is edible and its sap utilized as a mouth-wash and as a cure for "yaws," may perhaps account for the frequency with which the pattern is met with. Chas. Dance (*Chapters from a Guianese Log-Book*, Georgetown, 1881, pp. 304–5) gives the same interpretation to a very similar figure. On the other hand, certain of the Caribs recognize in this pattern the famous mythical snake which originally supplied them with their vegetable charms. Another plant represented on these pegalls is blade-grass or Savannah-grass waving in the wind (Plate XLVIII, Fig. 1).

Then we find a centipede (Fig. 2), butterflies (Fig. 7), and a certain edible periwinkle, shown by its sinuous tracks on the mud-flats in single (Fig. 3), double (Fig. 4), treble (Fig. 5), or multiple rows (Fig. 6).

The morokot (*Pacu*, sp.), one of the most esteemed of their fish, is pictured with its spotted body (Plate XLIX, Fig. 1).

Reptiles are also found space for—turtles, frogs, and snakes. Tortoise-shell in Figs. 2, 3. The frog is shown in Fig. 4, and again in Plate L, Fig. 4*a*, a form which degenerates into the dumb-bell shaped figure illustrated in Plate XLIX, Fig. 5. De Goeje (*Beiträge zur Völkerkunde von Surinam*, Leiden, 1908, p. 6) records a similar pattern from the sister colony. Snakes are represented in these designs by at least three different methods: by a more or less accurate figure of the body generally, as in the case of the "bush-master" (*Lachesis mutus*), shown in Plate L without (Fig. 1) or with (Figs. 2, 3, 4) the head (*h*) and tail (*t*); by a pictogram indicating the sinuous nature of the creature's movements (Plate LI, Figs. 1, 2), or its concentric arrangement when coiled at rest (Fig. 3); and by an imitation of the body-surface markings, as in the case of the land-camudi (boa-constrictor), shown in Figs. 4, 5, 6, and Plate LII, Fig. 1. Plate L, Figs. 3 and 4, illustrating portions of one and the same pegall, represent a snake about to swallow a frog: a similar combination is given by Dance (*op. cit.*)

Birds are indicated as flying (Plate LII, Fig. 2) with wings (*w*) outstretched from a body equal in size to the head (*h*). Dance (*op. cit.*) describes the pattern as "macaws or parrots flying," while De Goeje in Surinam (*op. cit.*) interprets it as "swallows, bats, or dancers." According to Pierre Barrere (*Nouvelle Relation de la France Equinoxiale*, Paris, 1743), an identical pattern was met with among the Galibis (Carib) of Cayenne. Birds are also represented by their three-claw tracks (Fig. 3).

The many species of Jaguar or "Tiger" (Plate LIII) are illustrated in characteristic fashion by the "spots" (*s*) indicated with varying degrees of complexity (Figs. 2, 3, 4) or by the bands (Fig. 1). Certain of the patterns (Figs. 5, 6) show phases in the decorative devolution from the original motif (Fig. 4): the same may be noted with Plate LIV, Fig. 1, derived from Plate LIII, Fig. 1.

Raccoons (*Nasua* sp.), the Kibihi of the Arawak, are pictured in a series of spotted bands (Plate LIV, Fig. 2) intended for their tails, while monkeys (Figs. 3, 4) and deer (Fig. 5) are illustrated in their entirety. A similar pattern of deer is figured by De Goeje from Surinam.

In none of these Pomeroon District patterns has a representation of the human form been met with: indeed, no record of it has been obtainable throughout the Colony. On the other hand, W. Joest (*Ethnographisches und Verwandtes aus Guayana*, 1893) gives a Surinam example of an erect human figure which I have adapted (Plate LV, Fig. 1) for comparison with the following series illustrative of the dog.

The motif of the dog (Fig. 2) forms a very interesting study as constituting the basis of many of the designs. The entire animal with raised ears (*e*) is viewed from the front; it is standing on its hind-legs (*f*) with all limbs extended outwards, and the male genitalia (*g*) fully exposed. The remaining ten illustrations (Plates LVI, LVII, LVIII) all indicate the hind-legs *cum annexis*, the artistic representation of which shows a marked development in Plate LVII, Figs. 1, 2, as compared with its degeneracy in Plate LVIII, Figs. 2, 3. Dance gives a picture practically identical with Plate LVII, Fig. 1, as the "Spirit of the Sheep," an explanation which, in view of the physically characteristic attributes of the male animal, easily becomes intelligible.

The meanings of a few of the patterns (Plate LIX) have been lost, even to the makers themselves: they were taught them by their fathers, but they have forgotten what they were supposed to represent.

Once the plaiting of the sides of the pegall (Plate LX, Figs. 1, 2) has reached completion, the two layers of strands (*a*, *b*) are tucked plait-wise respectively outwards and inwards upon themselves, and the projecting ends cut (*c*): the double edging thus produced is finally covered with two or three (Fig. 3) split cane slips and sewn into position, much in the same way that the edges of the square trays (Plate VI, Fig. 3) were shown to be protected.

To render the pegall rain-proof, the cover can be made double, *i.e.*, two trays are fitted one inside the other, and Ischnosiphon leaves ranged in between.

7. SATCHELS. (Plate LXV, Figs. 1, 2.)

These, very like the shape of the old-fashioned leather cigar-case, may almost be regarded as flattened pegalls: indeed, except for the commencing stages, they are plaited on identical lines and in similar patterns. The commencing stages are either in bar (Plate XLIV, Fig. 7) or herring-bone (Fig. 8 pattern, according to the width of top required.

8. PITCHER-SHAPE BASKETS. (Plate LXI, Fig. 1.)

As has been already mentioned, these are but developments of the round form of hour-glass pattern pegall, *i.e.*, one manufactured out of a square cover-top plaited around a single hour-glass, but show an important difference in that no pattern is worked into the sides. The whole of the latter is plaited first of all in the common herring-bone fashion of one strand under and over three (*a*) and then with one strand under and over two (*b*) to get the " bulge," the maximum of which is obtained by plaiting one under and over one (*c*): to lessen the bulge, the processes are reversed respectively, and thus the normal size once more reached.

9. CASSAVA-CAKE BASKETS. (Plate LXV, Figs. 10, 11.)

Like the preceding, these are but developments of the round form. Indeed, each may be regarded as the cover of an enlarged round pegall, turned upside down, and fixed in position by means of a circular band of split cane, etc., sewn along its free edges, the whole being supported on four legs attached, above to the band, and below to the corners. It is these baskets which store the cassava-cakes.

10. CHILDREN'S RATTLES.

Are also developments of the same round form of hour-glass pattern pegall. Instead, however, on completion of the sides, of tucking the strand ends (Plate LX, Fig. 4, *ab*) under themselves and cutting, these are tightly twisted and tied (Fig. 5) into a composite bundle to constitute the handle (*d*). Of course, previous to the twisting and tying, certain seeds, shells, etc., are inserted.

11. BUNDLE-SHAPE BASKETS. (Plate LXV, Fig. 6.)

This form would seem to be the most primitive type of plaited basket met with throughout the district. The body is made of a right-angled plait, one strand over and under one, each at about its own breadth apart from its parallel neighbour (Plate LXI, Fig. 2). Upon completion of this body, which is more or less square, the projecting ends of the strands along each of the four sides are collected into three portions, and worked into a triple plait (*p*), these four plaits being ultimately bent up and tied together on top, very much in the same style as the laundry-woman would tie the corners of a square sheet, etc., over a bundle of dirty washing. It was on account of such similarity that I have called this basket bundle-shaped.

12. SHALLOW ROUND-CORNERED BASKETS. (Plate LXV, Fig. 9.)

These are of at least three types, differing in the plait work constituting the body, but more or less uniform in that an additional continuous strand is inserted

to assist in the building up of the sides. In the following illustrations dealing with these particulars, only a portion of the corner of each basket is shown.

The body of the first type (Plate LXI, Fig. 3) is a right-angled plait, one strand over and under one, but the one series of parallel strands is wide apart while the other is close together; the projecting ends of the strands together form two layers crossing (*not* plaited into) one another more or less diagonally, and are locked into place by the continuous strand (*cs*).

In the second type (Fig. 4) the body is also a right-angled plait, but with one strand over and under two, and thus identical with the square sifter recorded in Plate XLI, Fig. 1, except that it is minus the latter's triple central commencing strands (*m*, *n*): the diagonal arrangement of the construction of the sides is similar to the previous type (Plate LXI, Fig. 3).

The body of the third type (Plate LXII, Fig. 1) consists of an upper (*u*) and a lower (*l*) layer of diagonally crossed (*not* plaited) parallel strands, separated by "interpolated" strands (*i*), but locked together by essential ones (*e*). The reason for the term "interpolated" is that, strictly speaking, such strands are not absolutely necessary for the actual plaiting of the bottom of the basket: they are only required as diagonal strands to help build up the sides. The continuous strand (*cs*), in the course of helping to build the sides, alternately separates the two layers of strands and locks them: in fact, as it winds concentrically around the body of the basket, it acts with each completed circuit alternately as an interpolated and essential strand.

13. KNAPSACKS OR SURIANAS.

These are slipper-shaped baskets (Fig. 6), the flat side of which fits against the back of the carrier. The construction of the Carib article (Fig. 2) is uniform throughout and identical with that of the body of the third type of shallow round-cornered basket just described: namely, two layers of diagonally crossed (*not* plaited) parallel strands, separated by interpolated (*i*) but locked by essential ones (*e*). In the Akawaio type, while the body (Fig. 3) is manufactured on the ordinary right-angled plait of one strand under and over three, the sides present the peculiarity of having two parallel series of strands plaited together diagonally (Fig. 4): stability is insured by interpolated strands (*i*), in the absence of which there would be too much "wobbling."

14. FEATHER-CROWNS AND HATS. (Plate LXIII, Figs. 1 to 5.)

The crown (Fig. 2) consists of a band (*a*) of size convenient to fit the wearer, to which is attached along its lower margin a projecting brim (*b*). The former is manufactured on similar lines as the collar of the cassava-squeezer (Part I, Plate XXXVIII, Fig. 4) and presents no difficulties. The latter (Fig. 3) is peculiar in that it is made up of a continuous strand (set edgeways with the plane of the brim) making concentric circuits around the lower edge of the band, each circuit as it

progresses (*cs* I) being locked indirectly with its immediate predecessor through the agency of a secondary continuous strand (*cs* II) coiled around it: the method of indirect locking is shown in the diagram (Fig. 4).

The old-time "hat" (Fig. 1) has both crown (*c*) and brim (*b*) manufactured on this same principle of two continuous indirectly interlocked strands, with one of them set edgeways: the band or side of the hat, though of two continuous strands, is of different construction (Fig. 5) in that there is no edgeways position of the main strand, each concentric circuit of which is attached to its immediate predecessor through the direct agency of the secondary strand.

15. Ant-mats. (Plate LXIII, Figs. 6, 7.)

Employed in certain ordeals, and as a punishment for youngsters, especially of the female sex. Certain varieties of "biting" ants are stuck into the smaller interstices (*a*), where they are held in place by stretching upon the handles (*h*) of the mat, which is then pressed as a whole upon the forehead, breast, stomach, or buttocks. The simpler form (Fig. 6) is that of a narrow band, plaited with strands one over and under one, their projecting extremities being plaited into a composite handle (*h*). The more complicated one is of a diamond shape (Fig. 7) made of two layers of diagonally crossed (*not* plaited) parallel strands, locked with transverse ones, after the pattern followed in the construction of the sides of the first and second types of shallow round-cornered baskets (Plate LXI, Figs. 3, 4).

16. Leaf-strand Boxes. (Plate LXIV.)

On the upper reaches of the Moruca River, I have seen the young Warrau boys amuse themselves in making tiny boxes out of the Kokerit palm (*Maximiliana Regia*). It is possible that these articles may refer to the tiny baskets woven of this tree as used, on the authority of Im Thurn (*op. cit.*, p. 317), for the transport of the Caraweera dye: they are certainly identical with the boxes employed for holding beads and other knick-knacks on the Rio Negro, as noted by Koch-Grünberg (*Zwei Jahre unter den Indianern,* Vol. I, p. 130). Such a box (Figs. 15, 16) consists, like the pegalls, of two trays, one for the body and one for the cover, the two components being manufactured on similar lines, as follows:—

Remove five septa (ABCDE) from the young, as yet unopened leaf, trim their extremities, etc., and cut into equal lengths.

Take four of these, fold them half-way, and interlock to form a square (Fig. 1) with eight "tails" (*Aa*, B*b*, C*c*, D*d*).

Turn the free end of A up upon itself, then D over A, C over D, and B over C, tucking the free extremity of B under A (Fig. 2): this central square will ultimately constitute the bottom of the tray.

Take the remaining septum (E), which will finally be the side of the tray, and, holding it vertically along its edge, pass A from without inwards over it, and then

under D (Fig. 3), pulling it (E) as taut as possible, and cutting it just as it emerges from underneath D (Fig. 4).

Now pass *c* from within outwards over E, and then into the space between itself and *d* : it will emerge behind C, when it is dragged upon and temporarily left there (Fig. 5).

The free end of D is now folded from without inwards over E, and then under C, dragged upon, and cut where it emerges (Fig. 6).

Then *b* is similarly passed from within outwards over E and back again between itself and *c*: it will emerge behind B, where it is pulled upon and left (Fig. 7).

Fold C from without inwards over E, then pass it under B, and cut it as it emerges (Fig. 8).

Now pass *a* from within outwards over E, and back again between itself and *b* : it will emerge behind D, where it is pulled upon and left (Fig. 9).

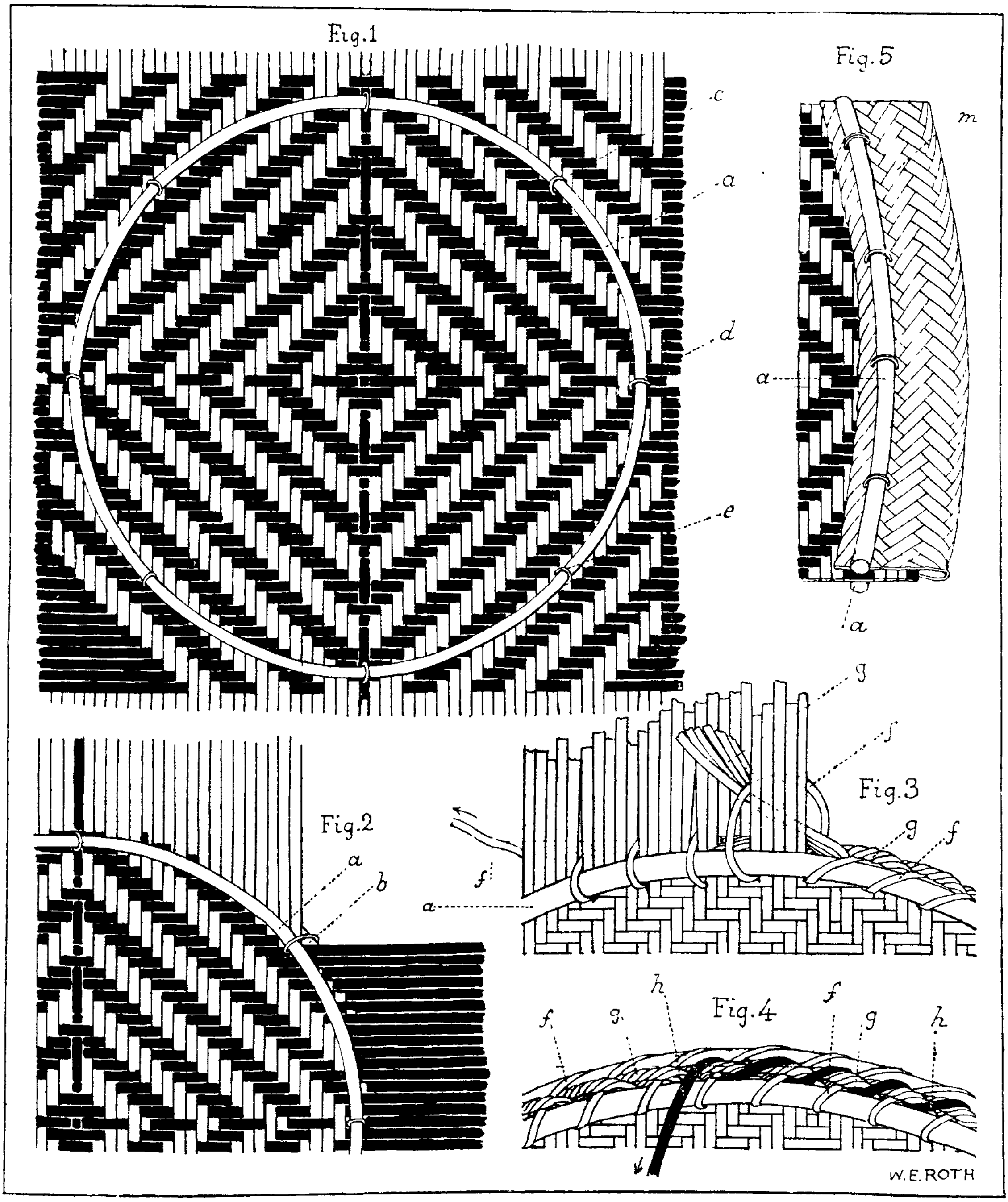
Fold B from without inwards over E, and then under A, cutting it as it emerges (Fig. 10).

Pass *d* from within outwards over E, and back again between itself and *a* : it will emerge behind C, where it is pulled upon and left (Fig. 11).

E is now finished with, in either one of two ways: by being passed over and under (Fig. 12) each successive loop (*i.e.*, over A, under *c*, over D, under *b*, over C, under *a*, over B, under *d*), or, by being passed under each successive loop (Figs. 15, 16).

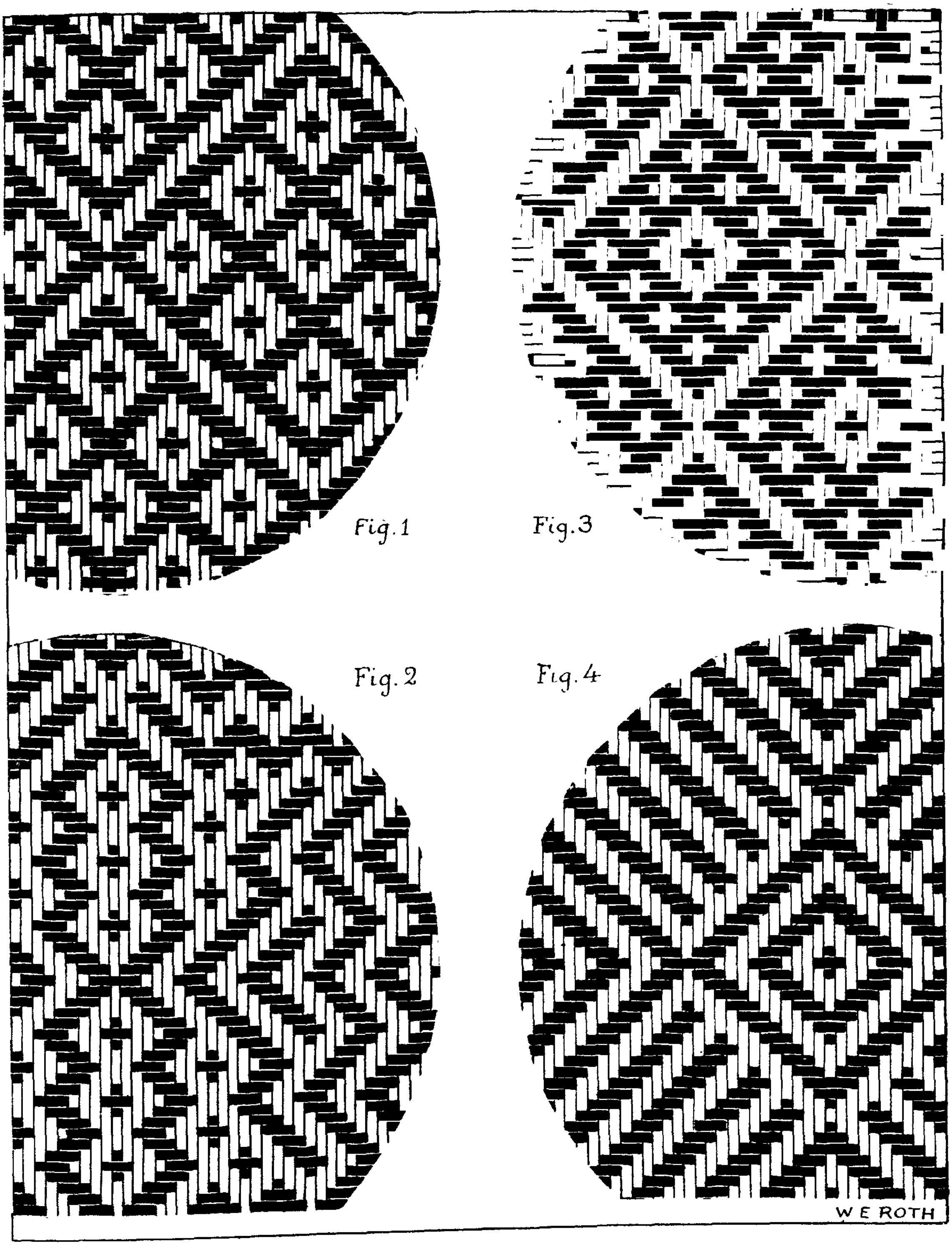
The tray is now turned over (Fig. 13). Starting with *b*, this is turned at an angle of 45 degrees and passed from within outwards under the loop formed by its strand lying immediately below: on emerging, it is pulled upon and cut.

The same thing (*i.e.*, turning up at half a right angle, etc.) is then carried out with *a*, *d*, and *c*, and the central star on the outside of the tray thus completed (Fig. 15).



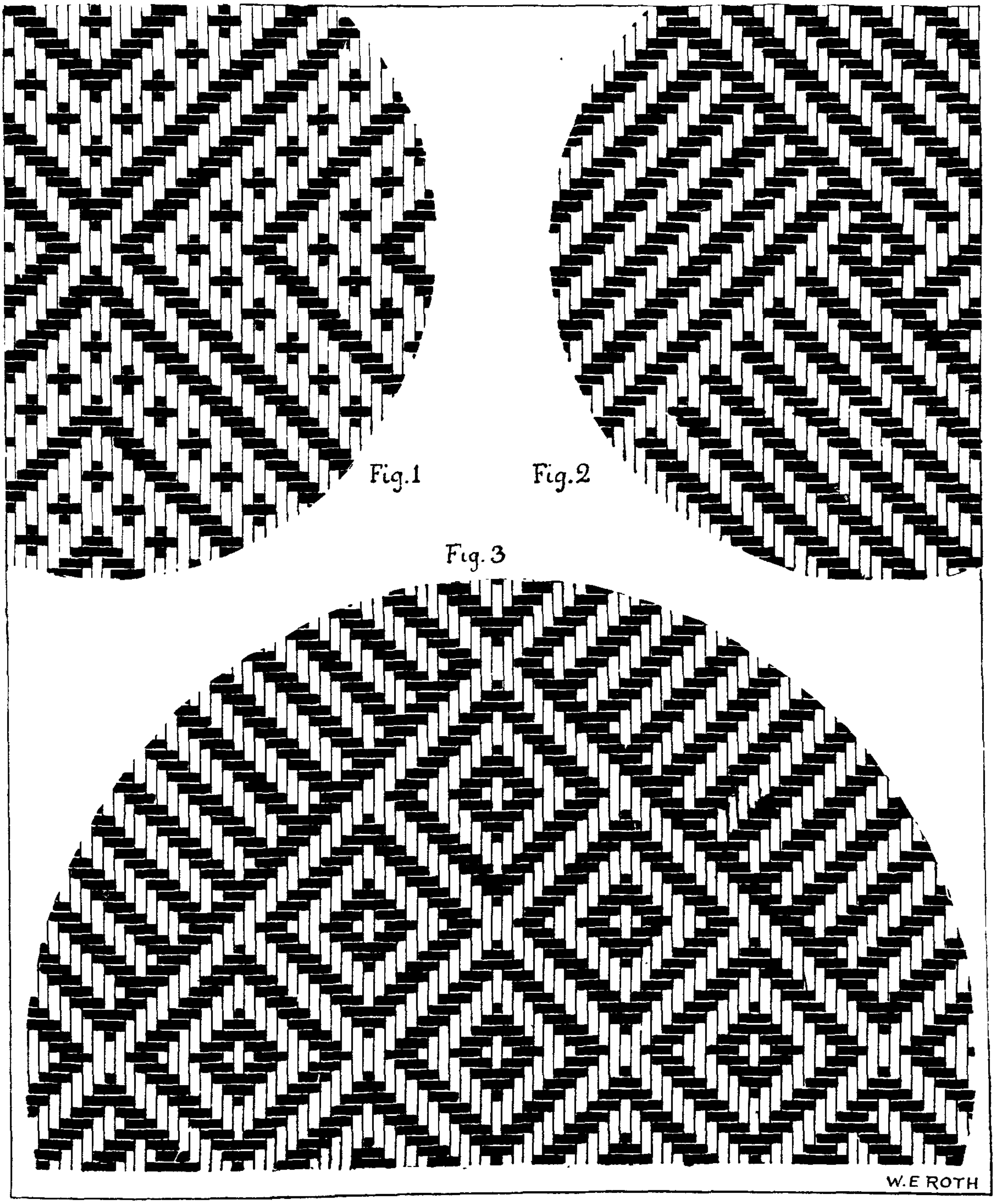
CONCAVE CIRCULAR TRAYS: THE ITE-FLOUR SIFTER.

Figs. 1, 2: Manufacture of the "Tray" proper. Figs. 3, 4: The orthodox Warrau method of fixing the edges. Fig. 5: A simpler, but weaker method.



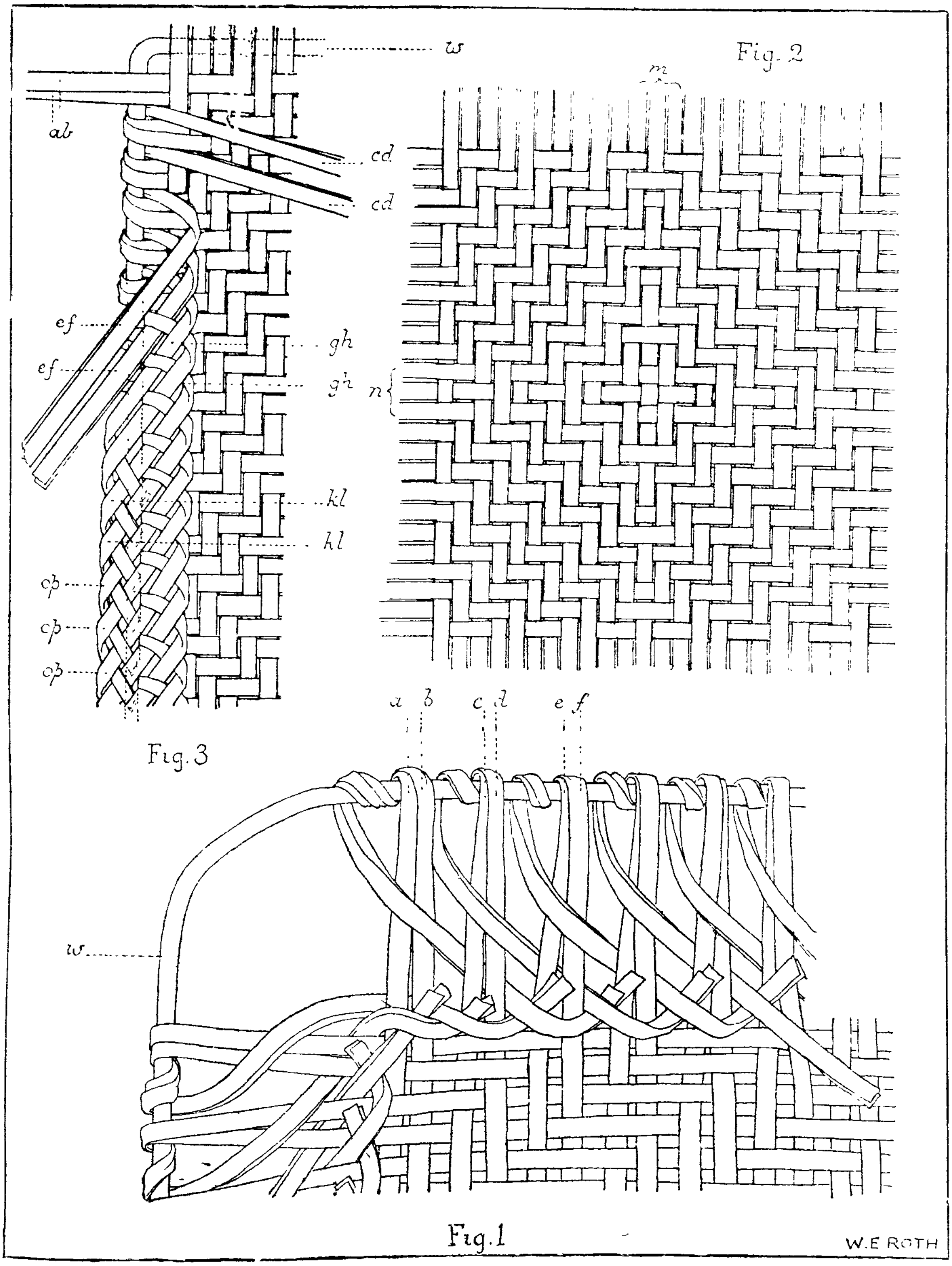
CONCAVE CIRCULAR TRAYS.

All Warrau patterns: The diamond-snake (Fig. 1), periwinkle-track (Fig. 2), and monkey-skull (Fig. 4). Meaning of Fig. 3 unknown.



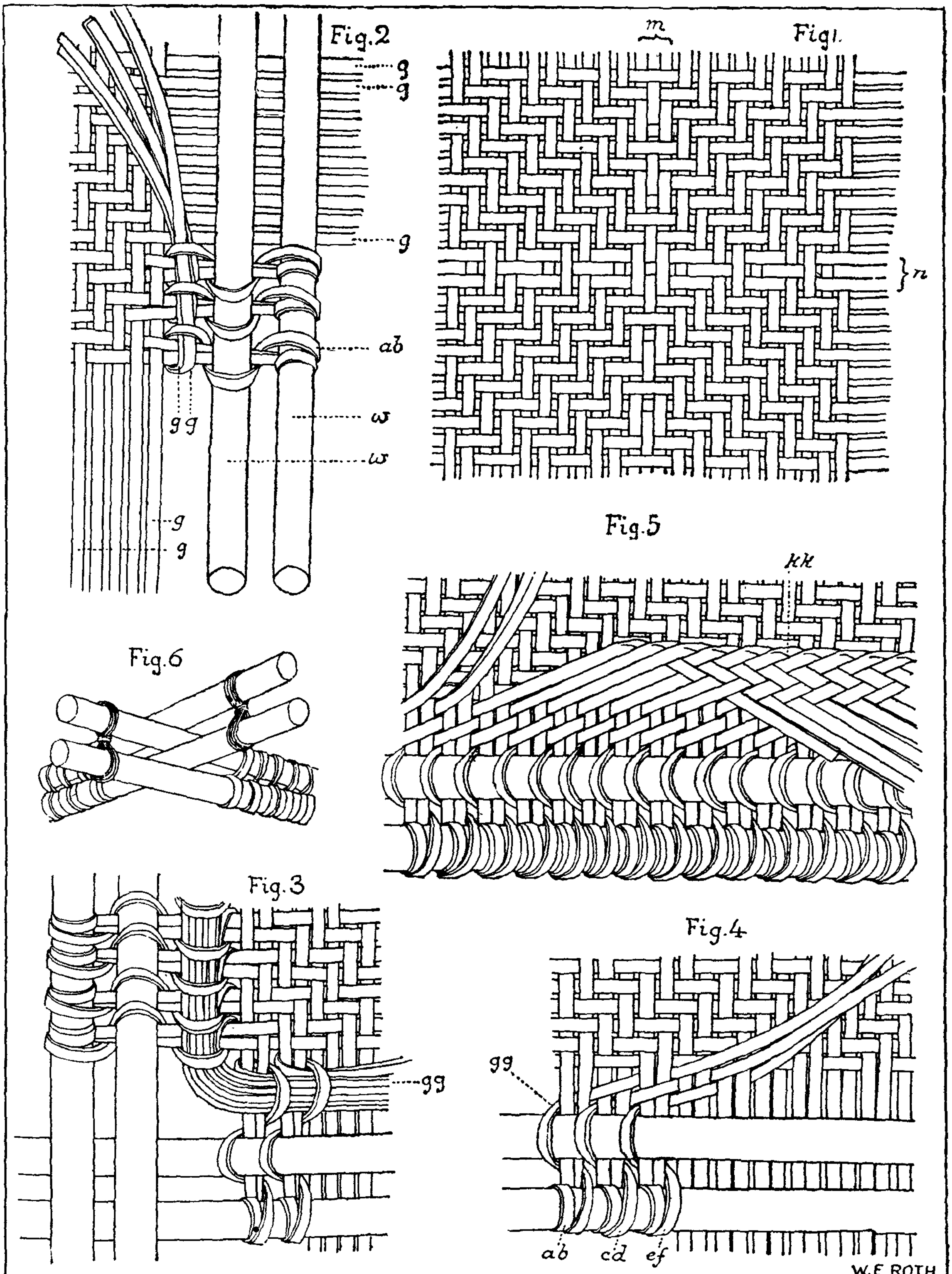
CONCAVE CIRCULAR TRAYS.

Warrau and Akawai-o patterns: The quartering of a cassava-cake (Fig. 2). Meaning of Figs. 1 and 3 unknown.



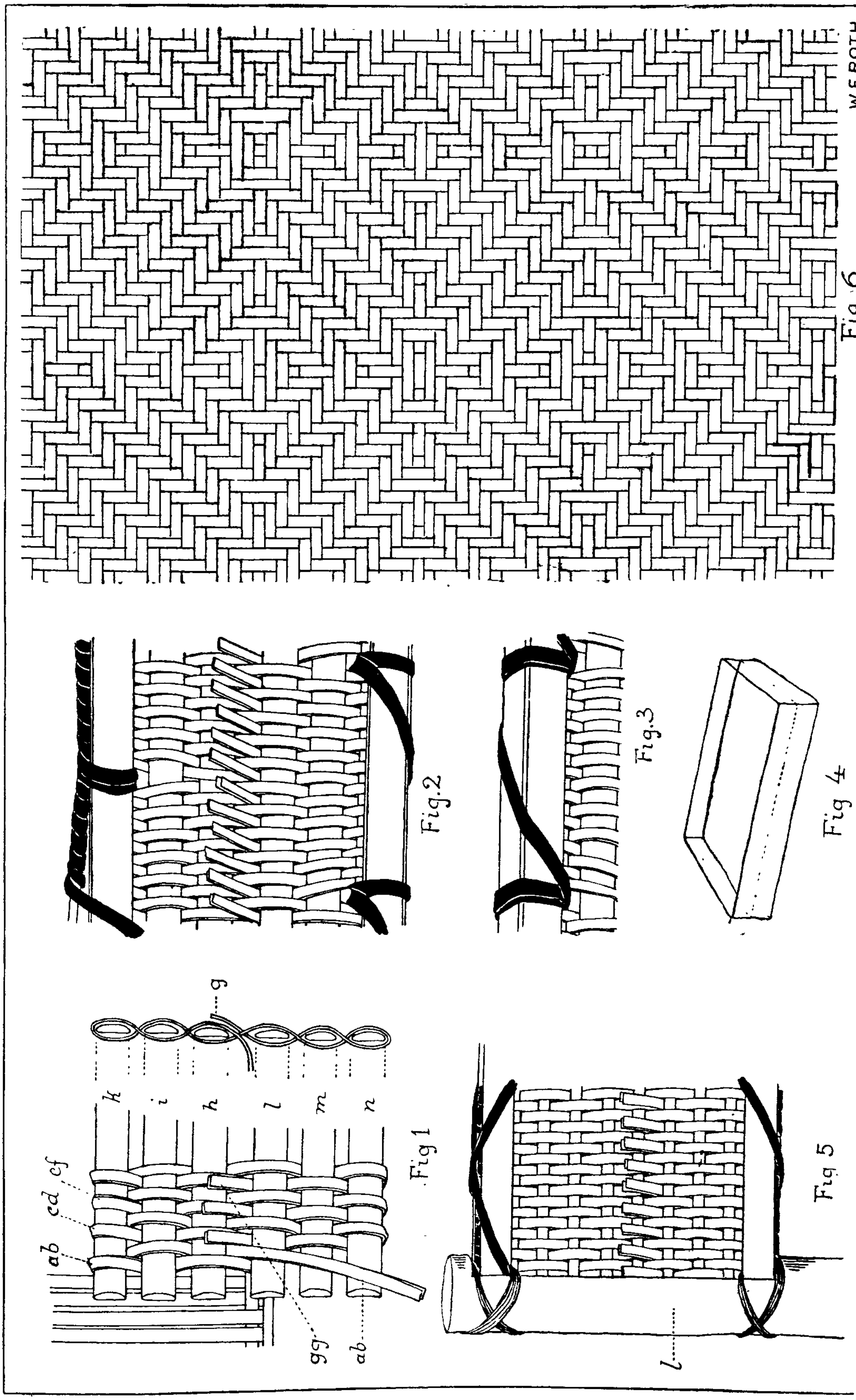
SQUARE MATS.

Carib (Fig. 1), and Akawai-o (Figs. 2, 3).



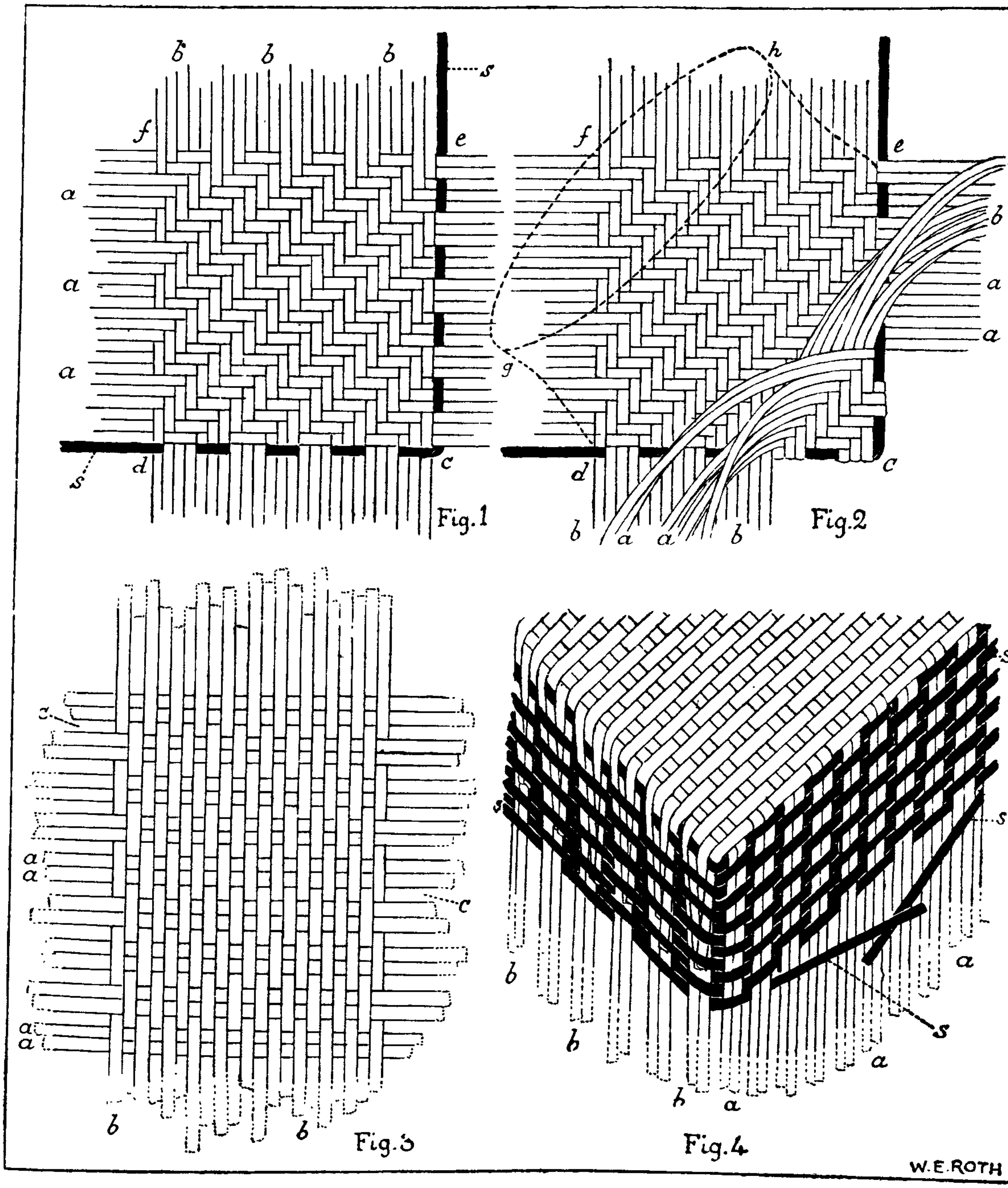
SQUARE CASSAVA-SIFTERS.

The pattern of the "Square" (Fig. 1). The orthodox edging for home-use (Figs. 2, 3).
For sale and barter (Figs. 4, 5).



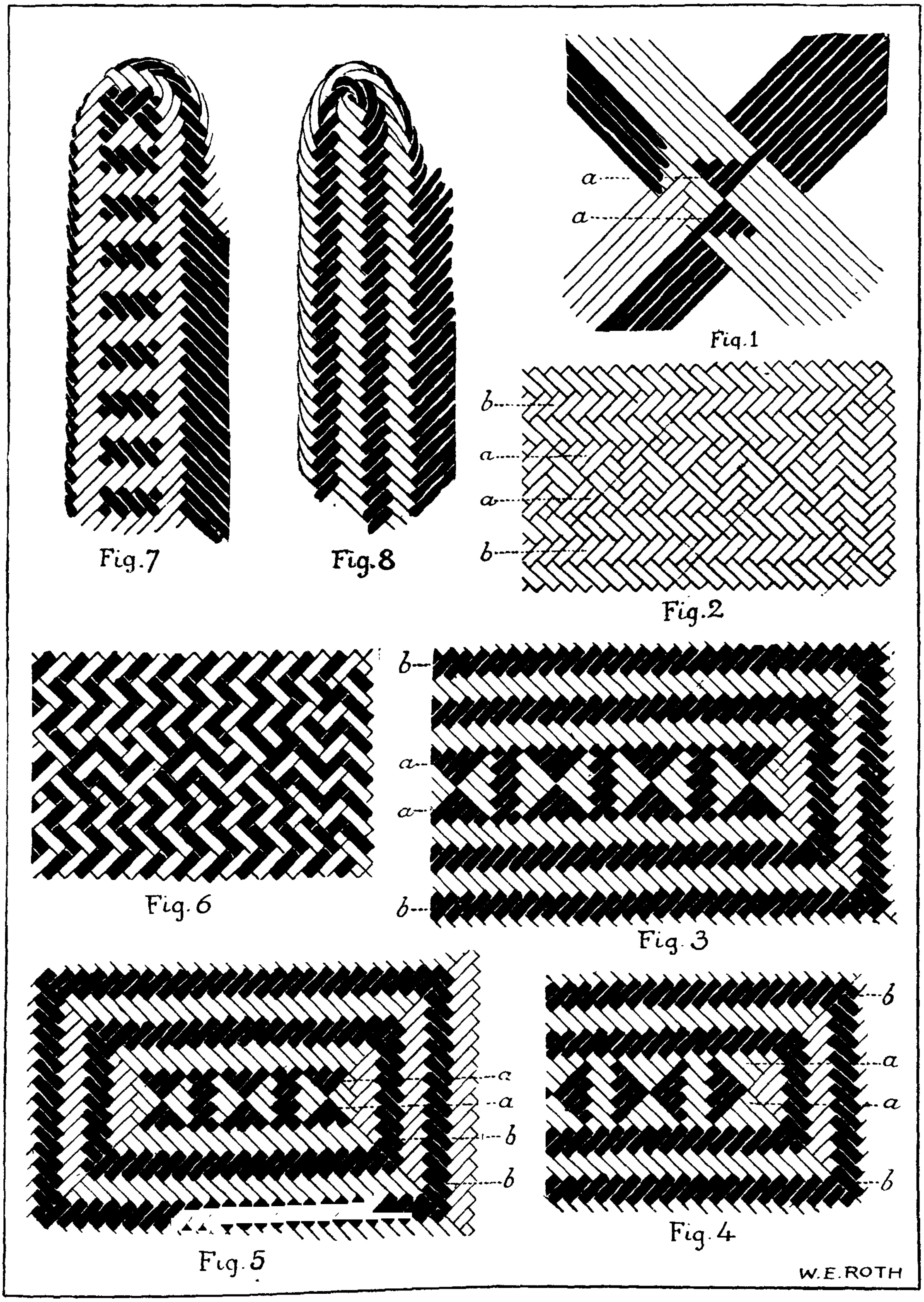
SQUARE TRAYS.

The diamond-snake pattern on the Tray (Fig. 6). The manufacture of the edges (Figs. 1, 2, 3). The completed Tray (Fig. 4). The fixation of a leg (Fig. 5).



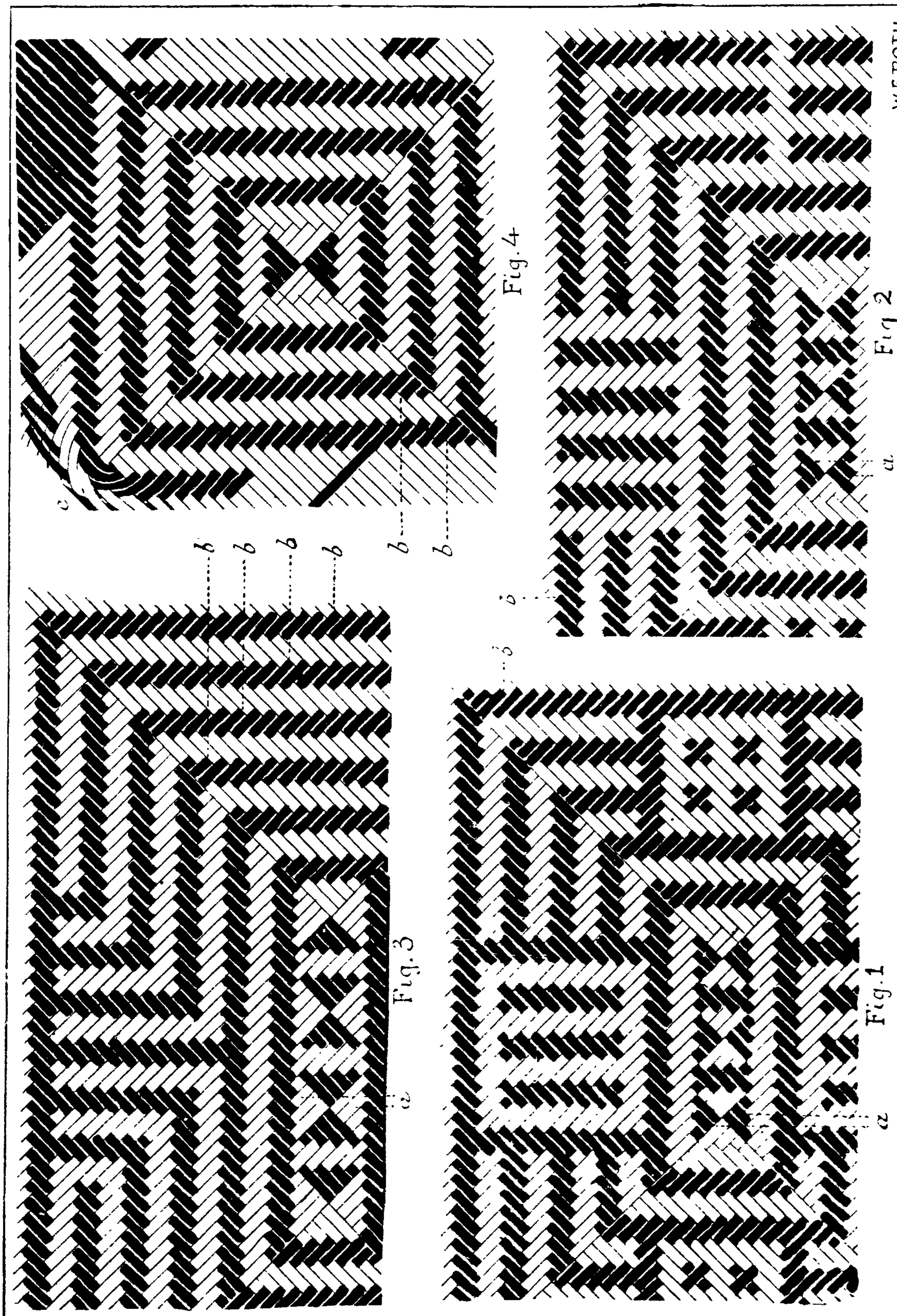
CONICAL BASKET.

(Figs. 1, 2.) "Armadillo"-Pegall (Figs. 3, 4).



COMMENCING STAGES IN THE MANUFACTURE OF "HOUR-GLASS."

Pegalls (Figs. 1 to 6), and Satchels (Figs. 7, 8).



HOUR-GLASS PEGALLS.
Varieties of Pattern on the Tops of the Covers.

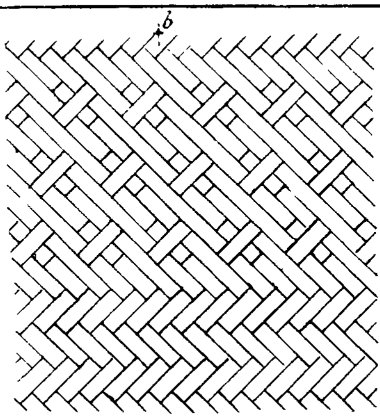


Fig 1

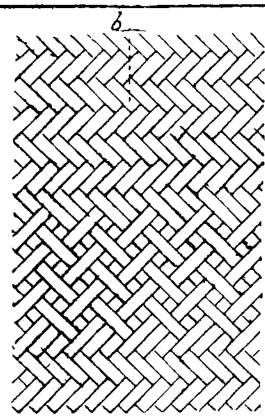


Fig 2

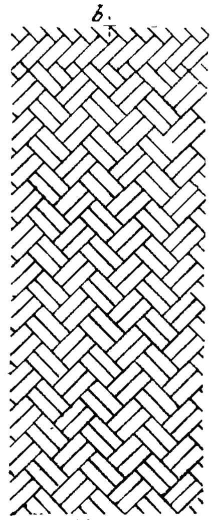


Fig. 3

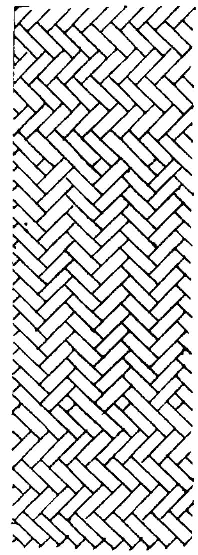


Fig. 4

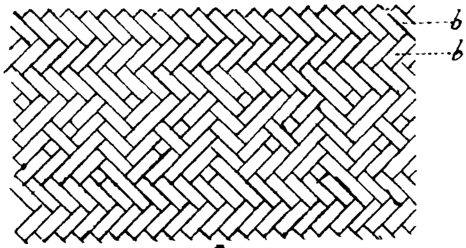


Fig. 5

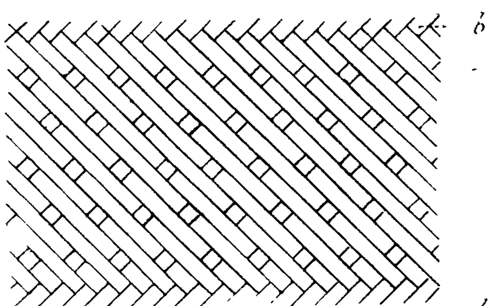


Fig. 6

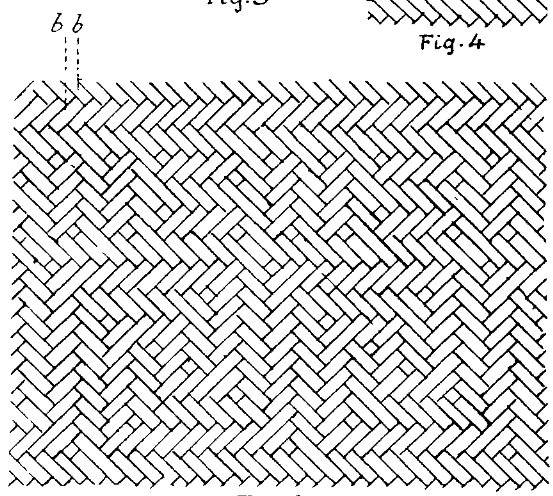


Fig. 7

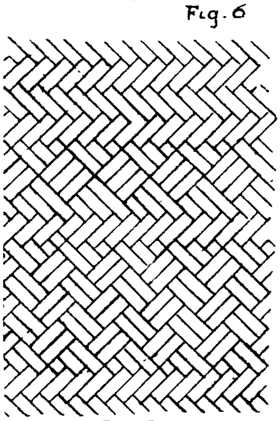


Fig. 8

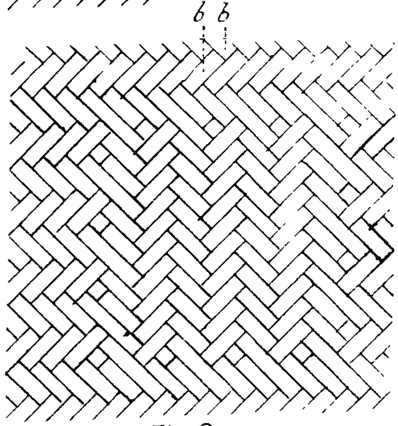


Fig. 9

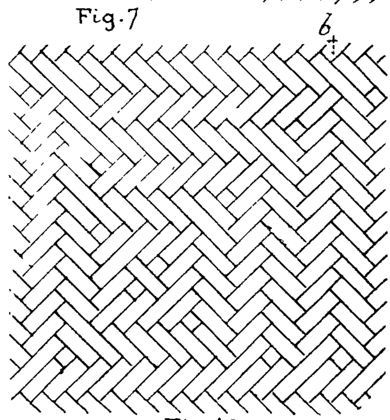


Fig. 10

W. E. ROTH

HOUR-GLASS PEGALLS WITH UNCOLOURED STRANDS.

Patterns observed on the sides.

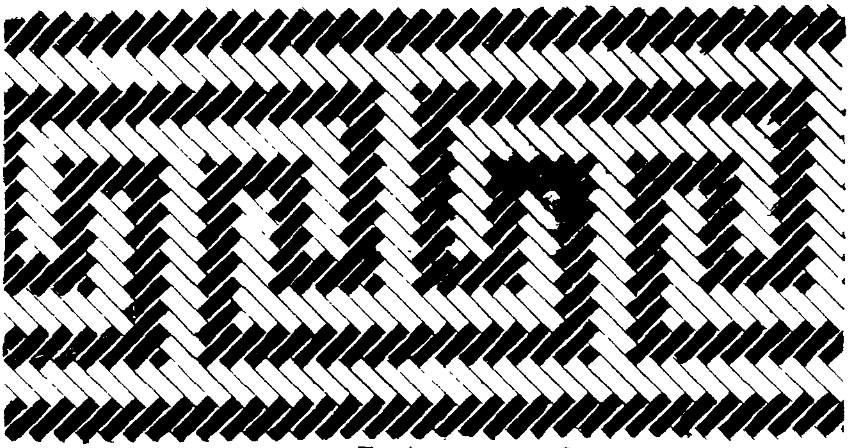


Fig. 1

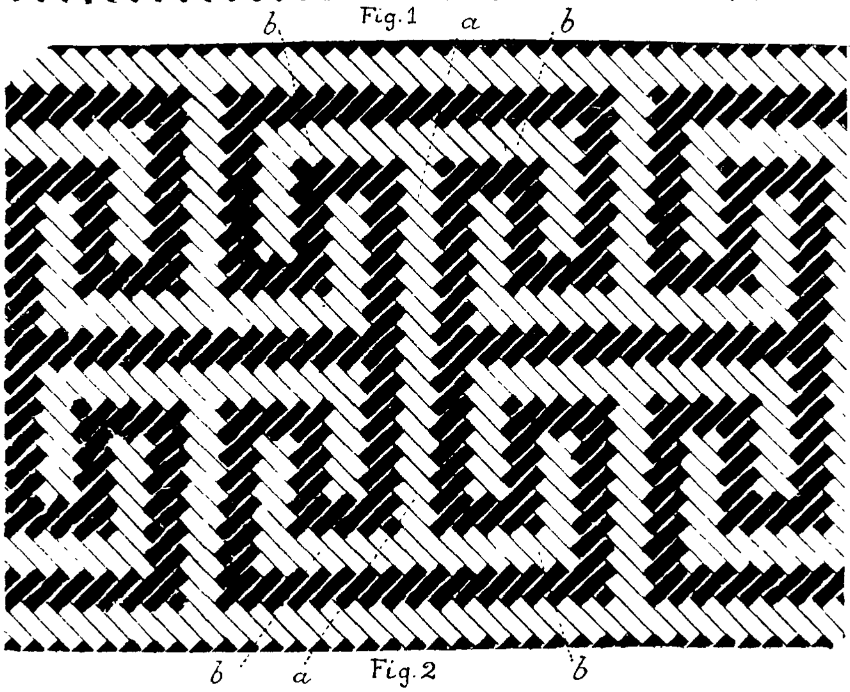


Fig. 2

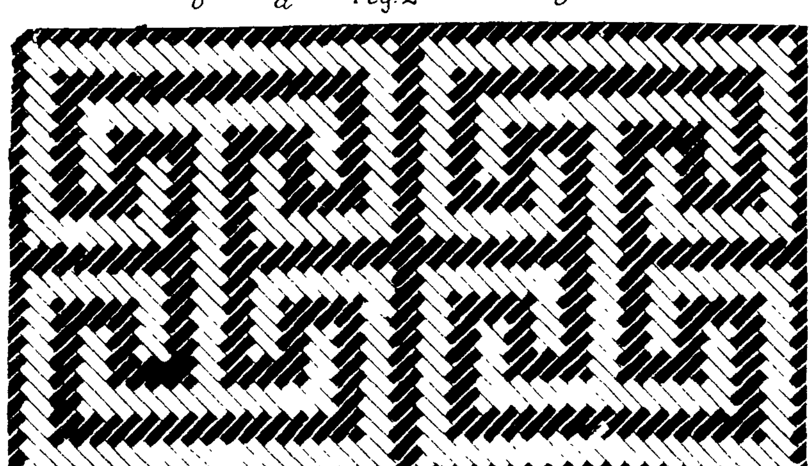
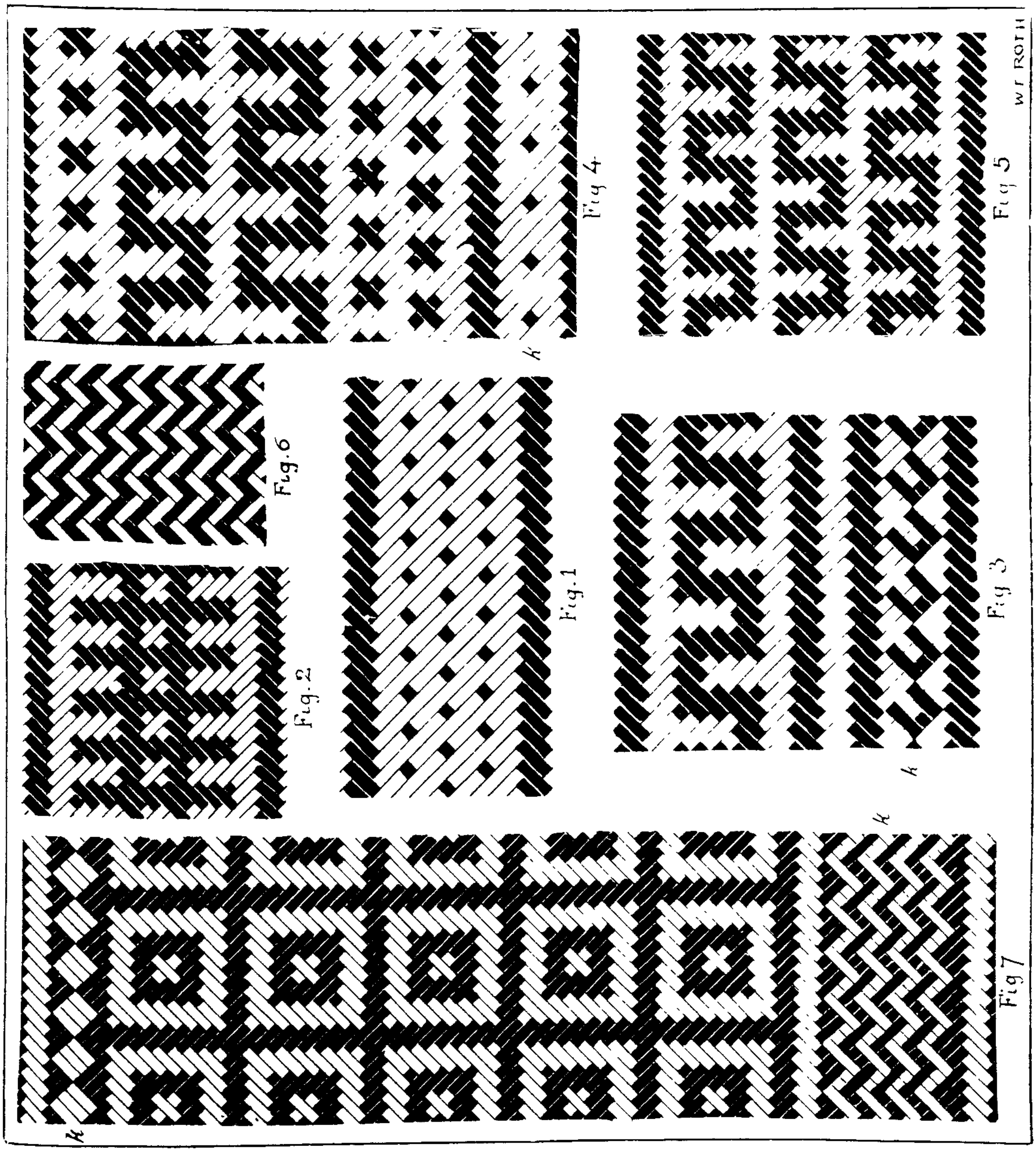


Fig 3

W.E. ROTH

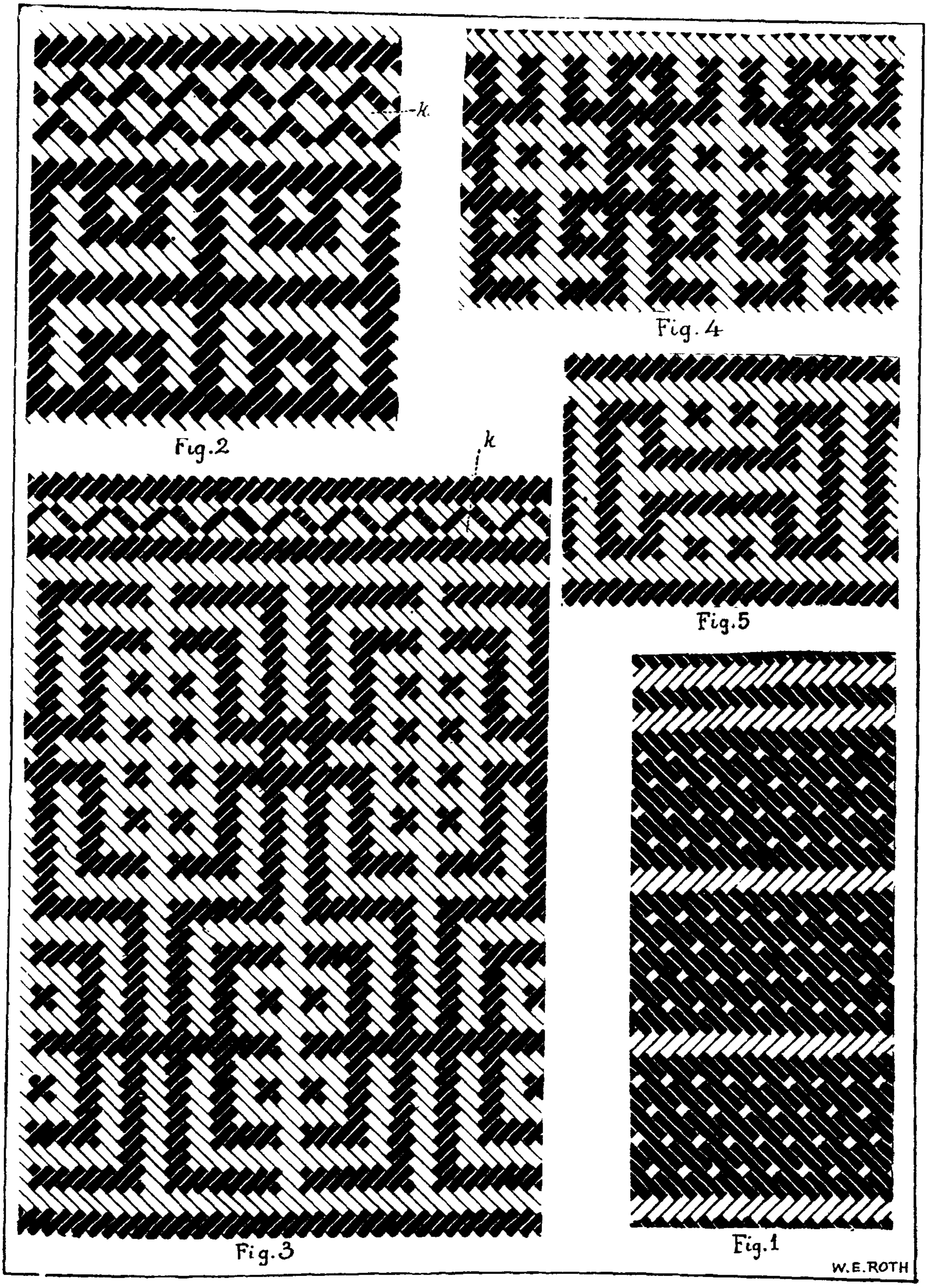
HOUR-GLASS PEGALL PATTERNS.

The "darli" or Wild Nutmeg.



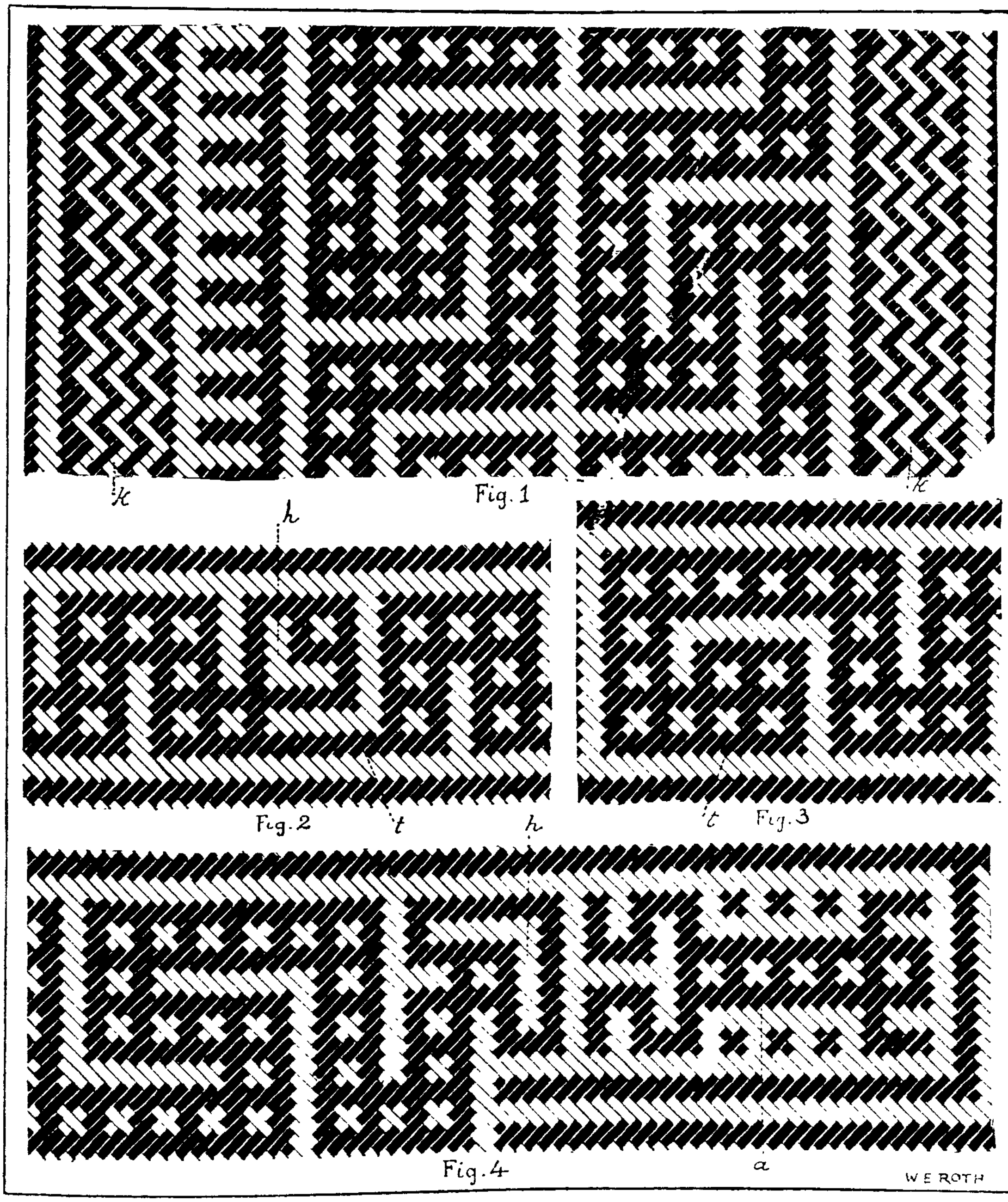
HOUR-GLASS PEGALL PATTERNS.

Blade- or Savannah-grass (Fig. 1). Centipede (Fig. 2). Butterflies (Fig. 7). Periwinkle tracks (Figs. 3, 4, 5, 6).



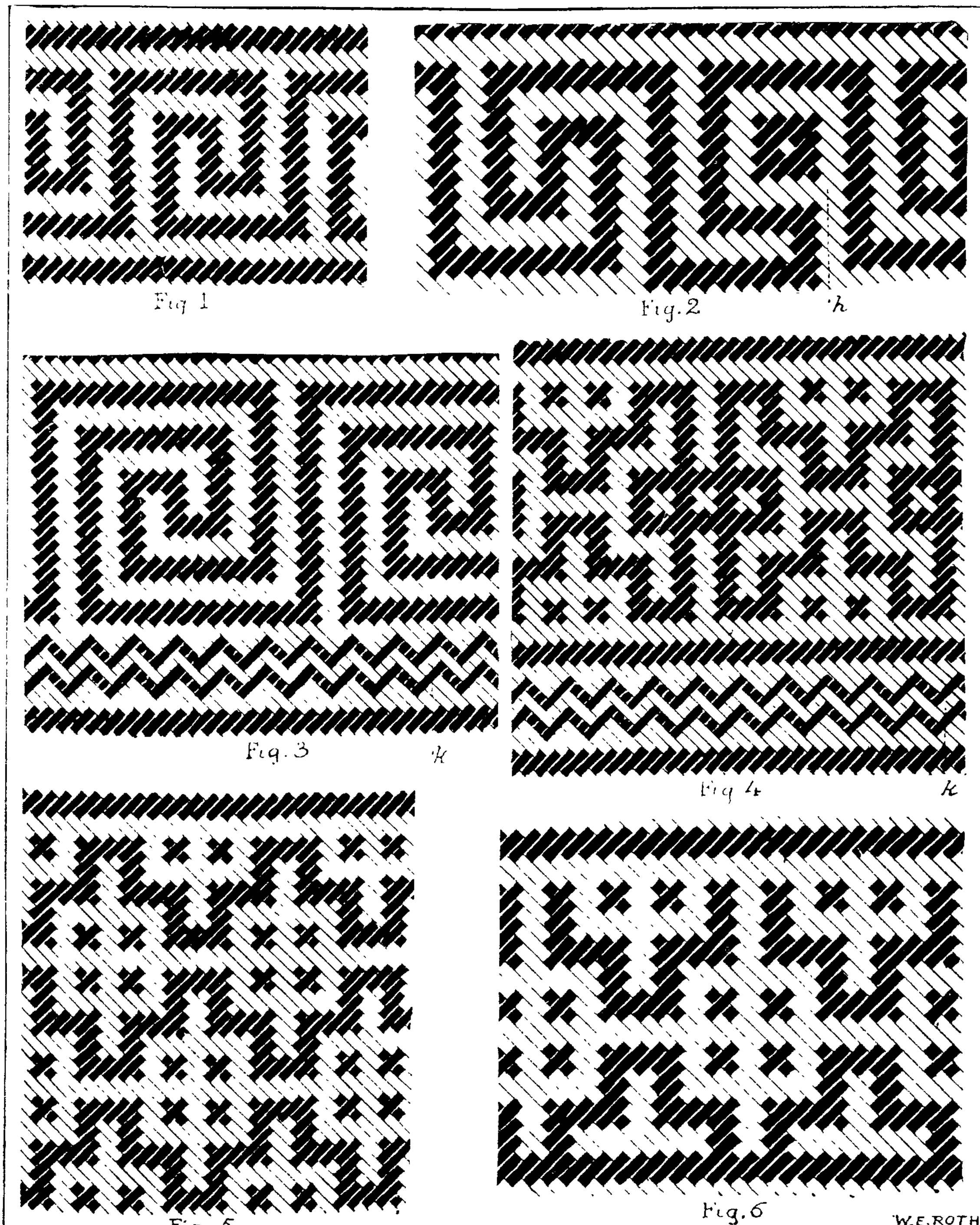
HOUR-GLASS PEGALL PATTERNS.

Morokot fish (Fig. 1). Turtle-shell (Figs. 2, 3). Frog (Figs. 4, 5).



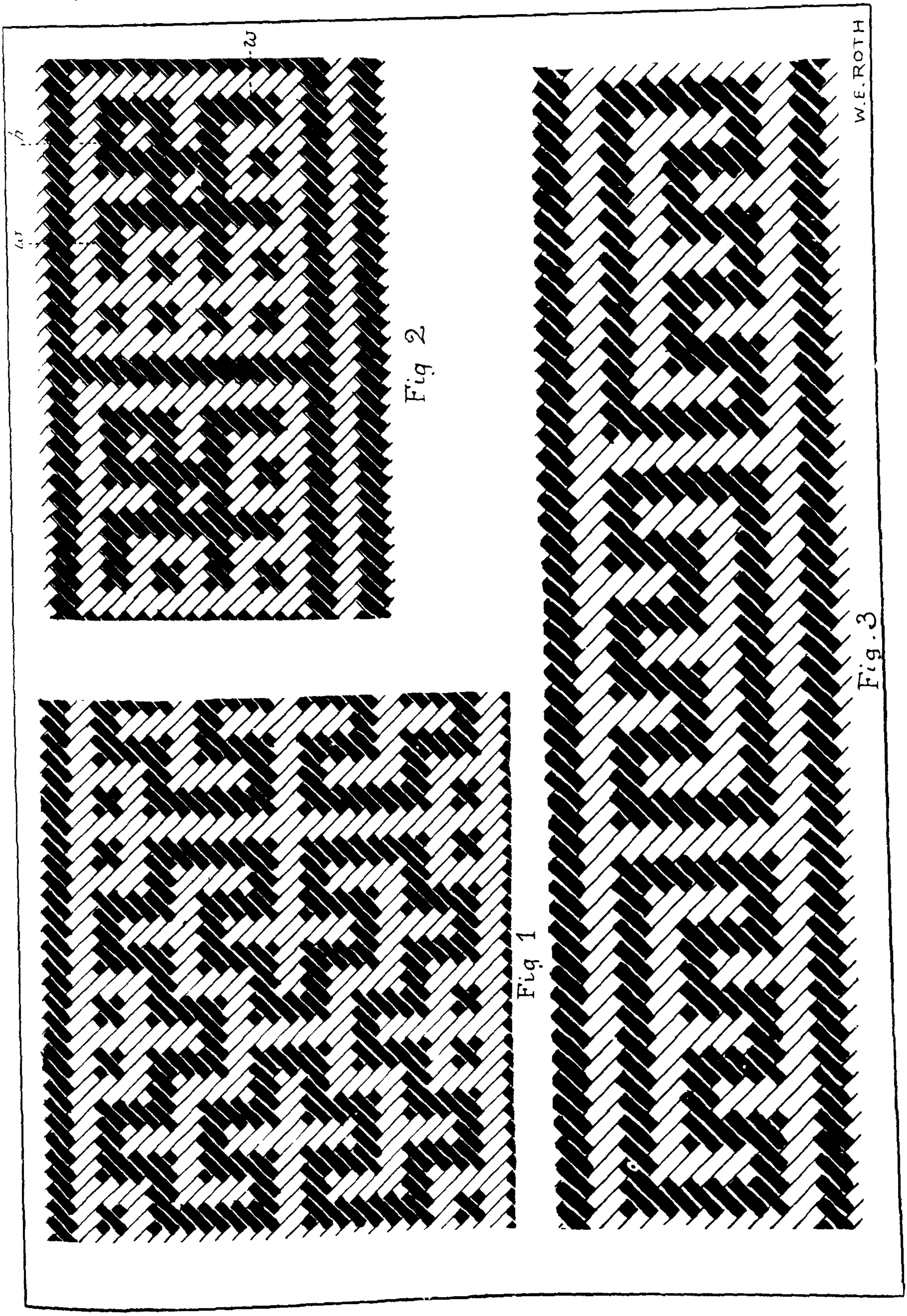
HOUR-GLASS PEGALL PATTERNS.

Snake: Showing body alone (Fig. 1): with head (*h*) and tail (*t*) (Figs. 2, 3, 4). Swallowing a frog (*a*) (Fig. 4).



HOUR-GLASS PEGALL PATTERNS.

Snake: Indicated by its sinuous movements (Figs. 1, 2): when coiled at rest (Fig. 3): showing the body-surface markings (Figs. 4, 5, 6).



HOUR-GLASS PEGALL PATTERNS.

Camudi-snake (Boa-constrictor) indicated by its body-surface markings (Fig. 1). Birds: Flying (Fig. 2): Their three-claw tracks (Fig. 3).

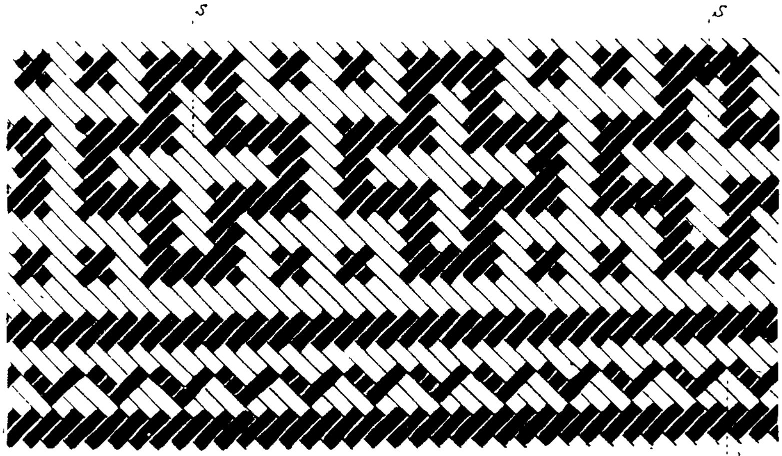


Fig 3

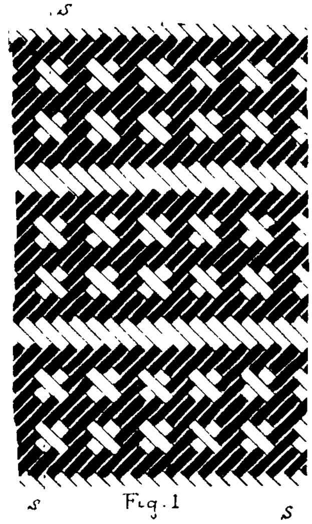


Fig. 1

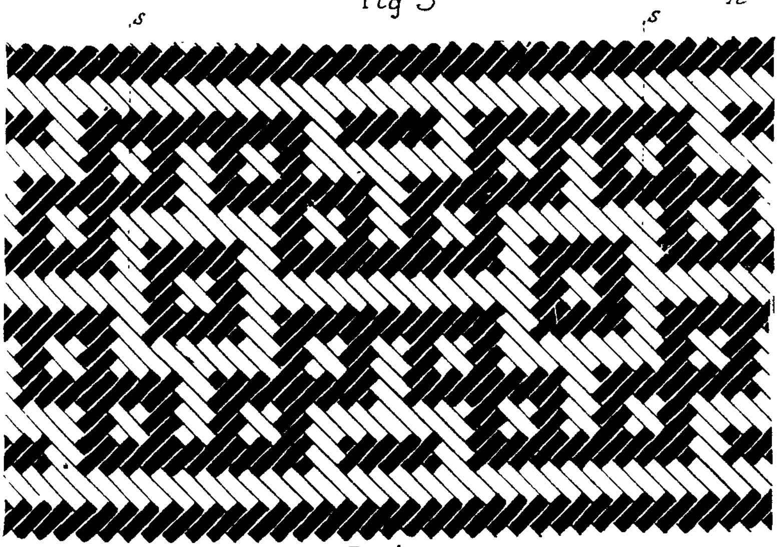


Fig. 4

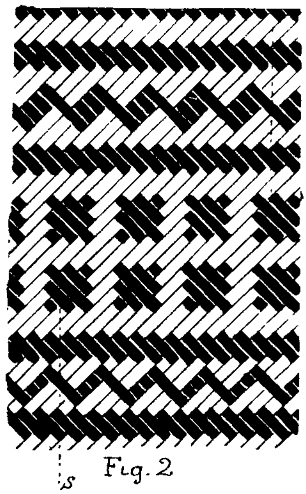


Fig. 2

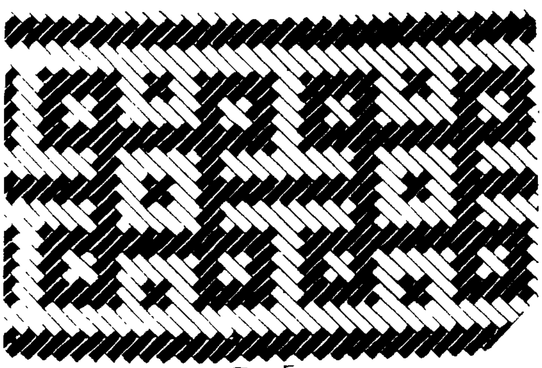


Fig. 5

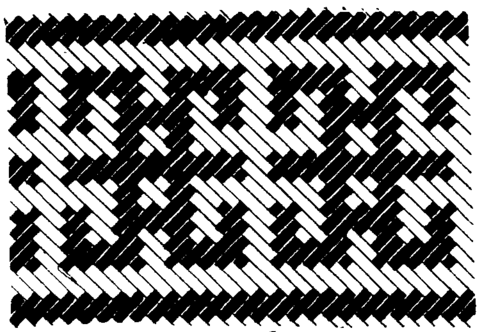
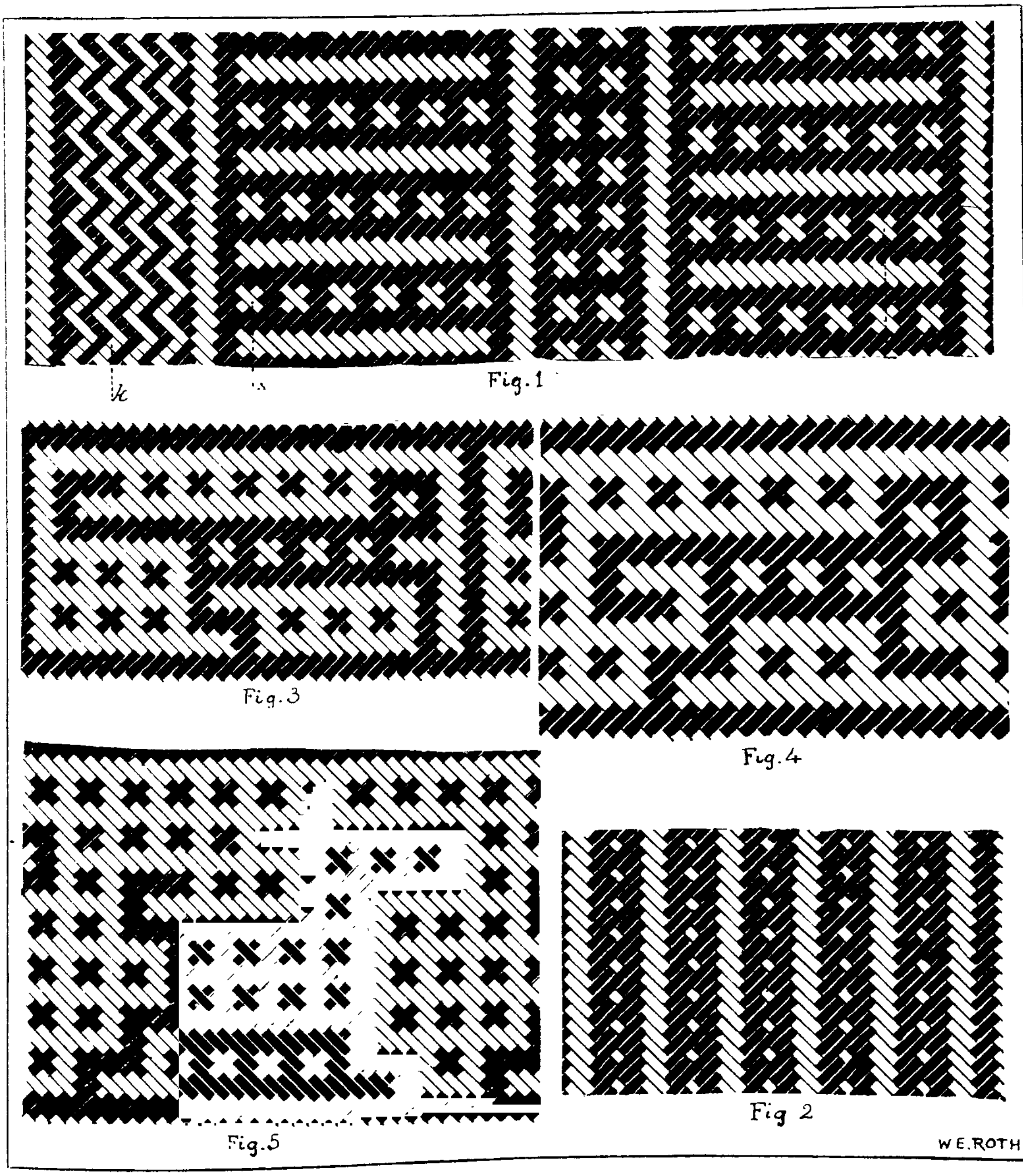


Fig. 6

W. E. ROTH

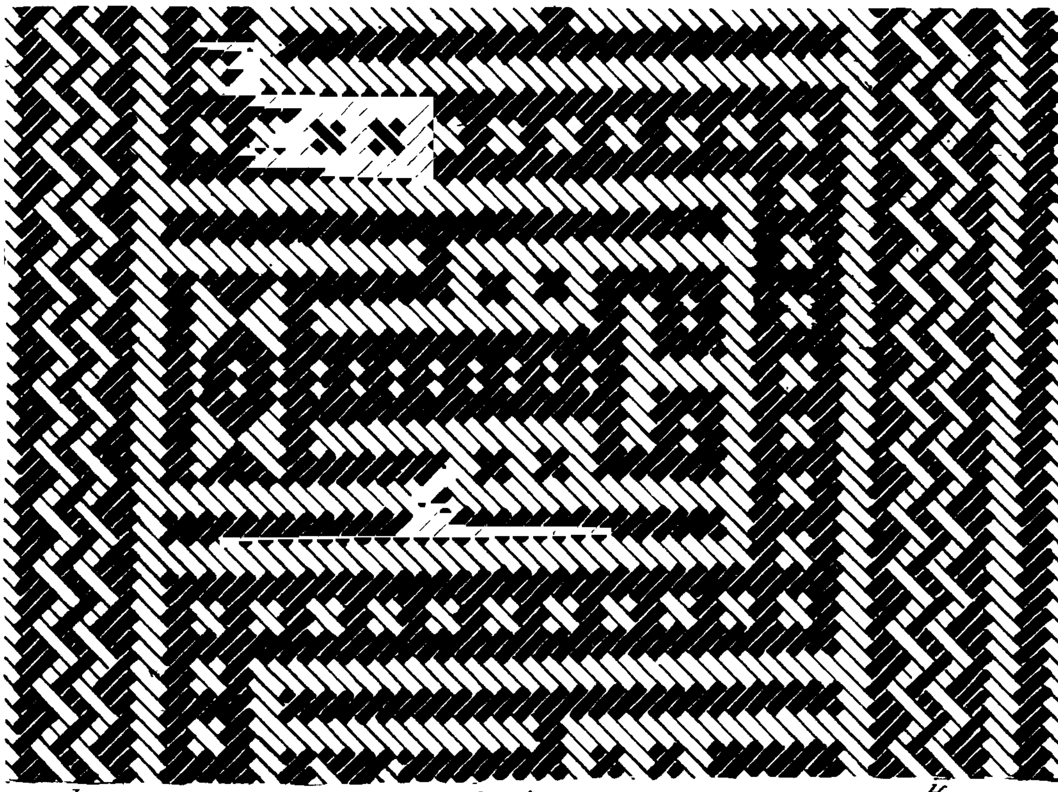
HOUR-GLASS PEGALL PATTERNS.

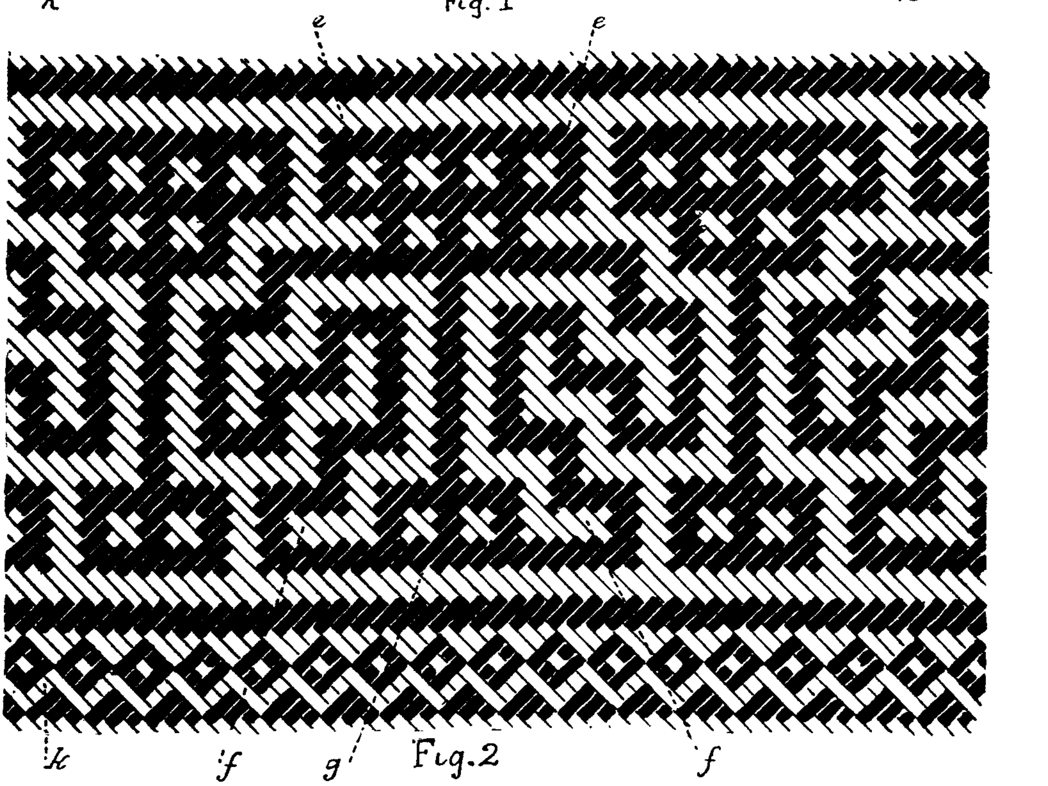
"Tiger" (Jaguar): Represented by bands (Fig. 1) or spots (Figs. 2, 3, 4). Note the devolution of the pictograms 5 and 6 from that represented in Fig. 4.



HOUR-GLASS PEGALL PATTERNS.

"Tiger" (Jaguar) represented by the bands (Fig. 1). Raccoon, indicated by the tail (Fig. 2). Monkey (Figs. 3, 4). Deer (Fig. 5).





HOUR-GLASS PEGALL PATTERNS.

Man (Fig. 1). Dog (Fig. 2). The latter is represented standing, and viewed from the front, with ears (*e*) and limbs extended, and male genitalia (*g*) exposed.

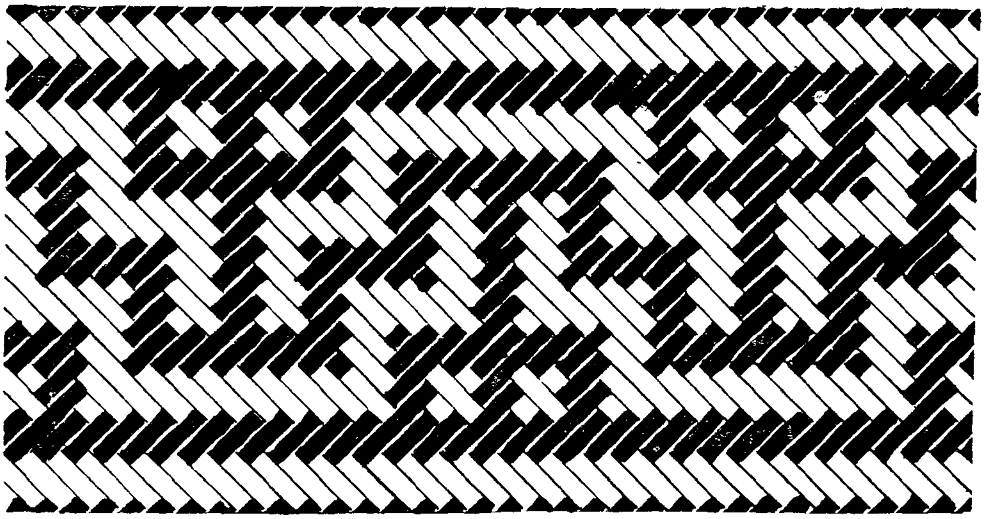


Fig. 1

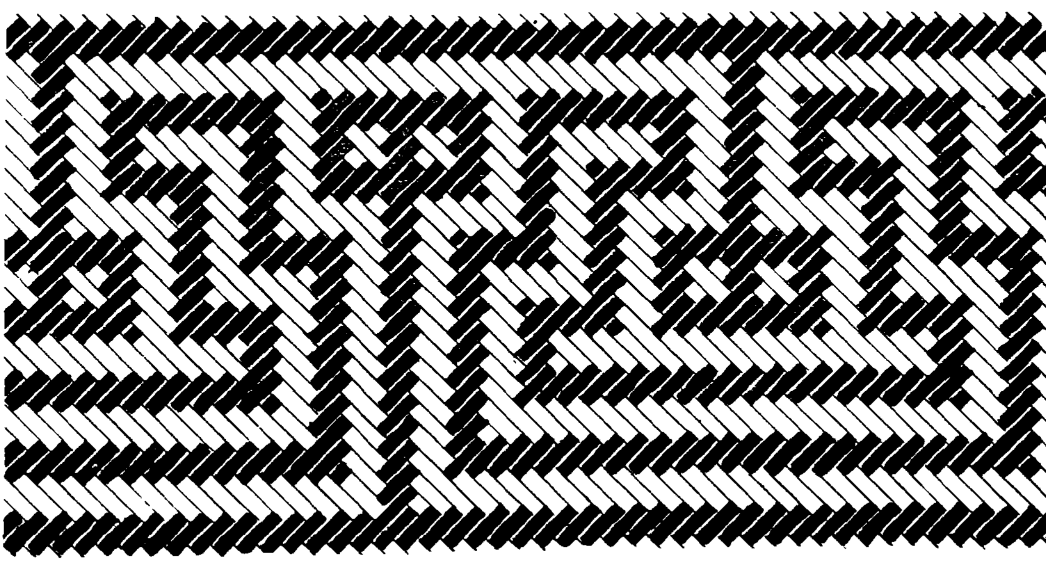


Fig. 2

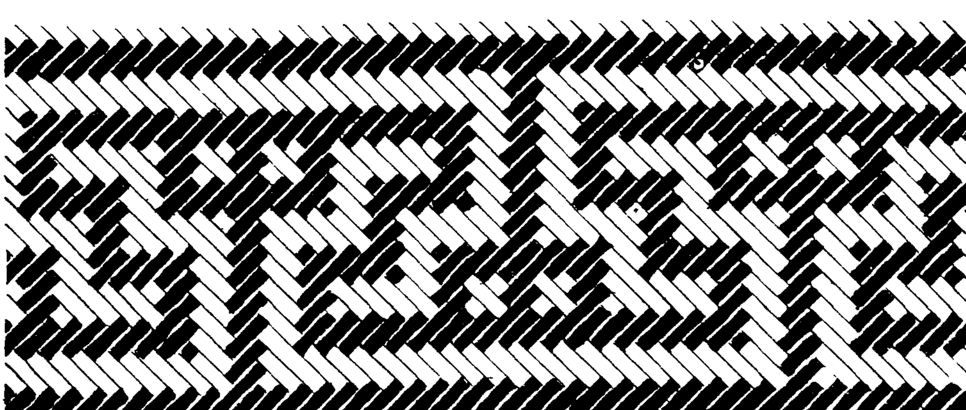


Fig. 3

W.E.ROTH

HOUR-GLASS PEGALL PATTERNS.

Dog : This and the following two plates have as their motif the limbs and genitalia as shown in the previous plate.

W.E. ROTH

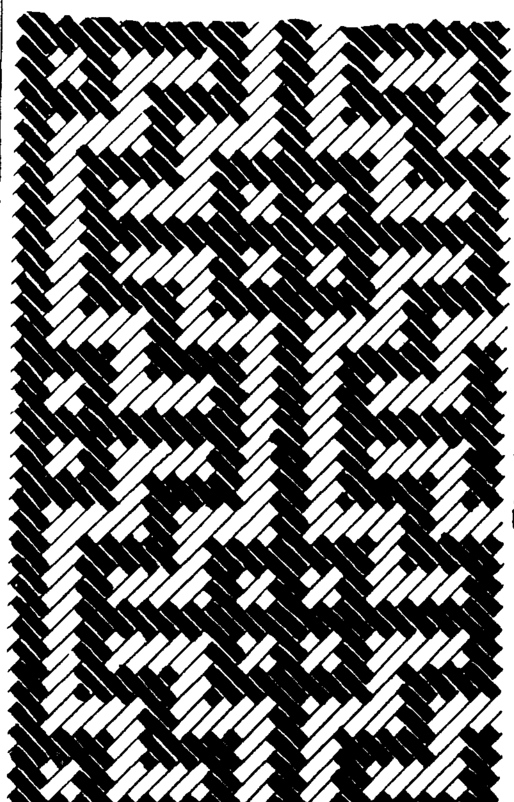


Fig. 1

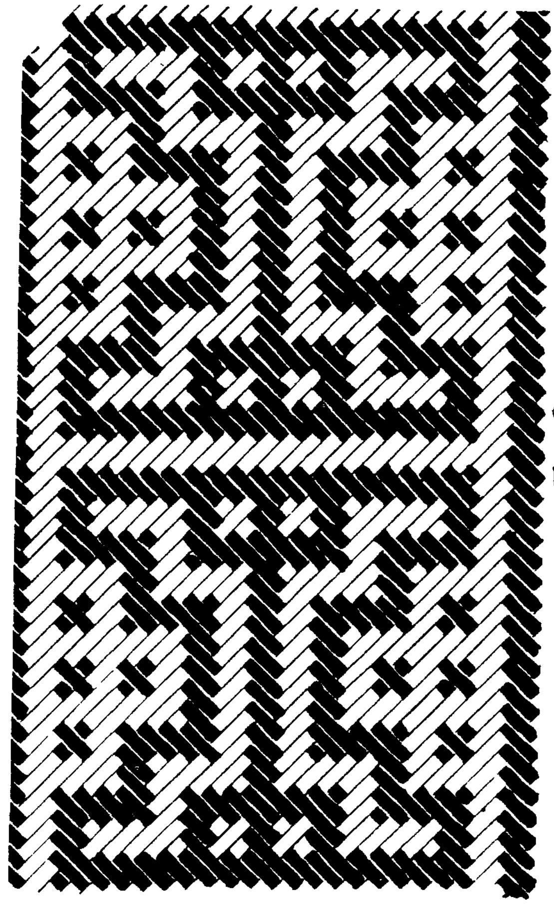


Fig. 2

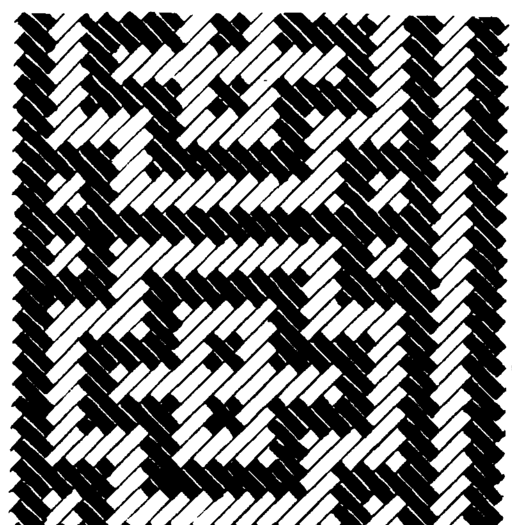


Fig 3

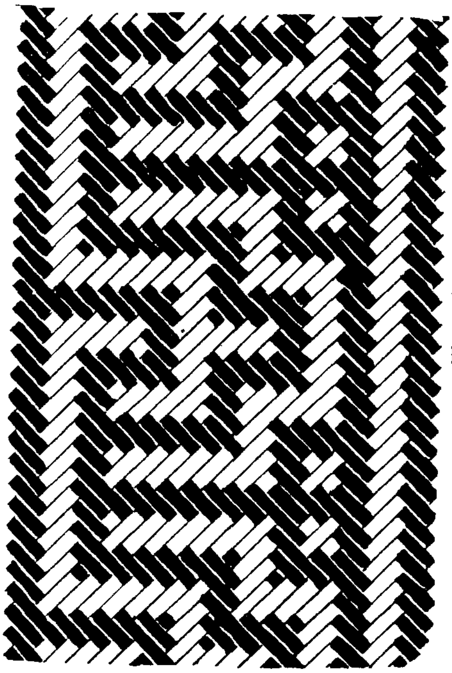


Fig. 4

HOUR-GLASS PEGALL PATTERNS.

Dog: See previous plate.

Fig. 1

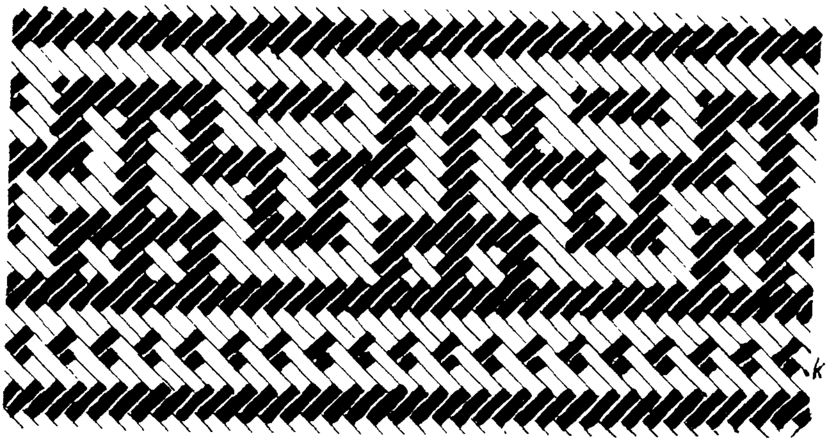


Fig. 2

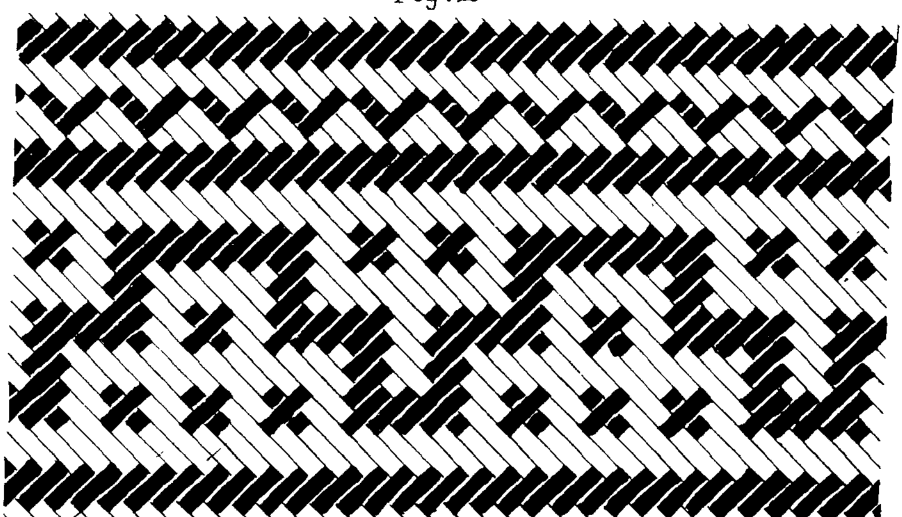
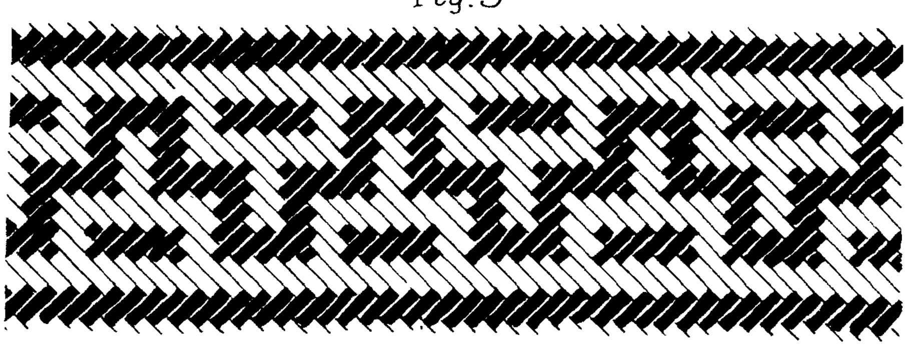


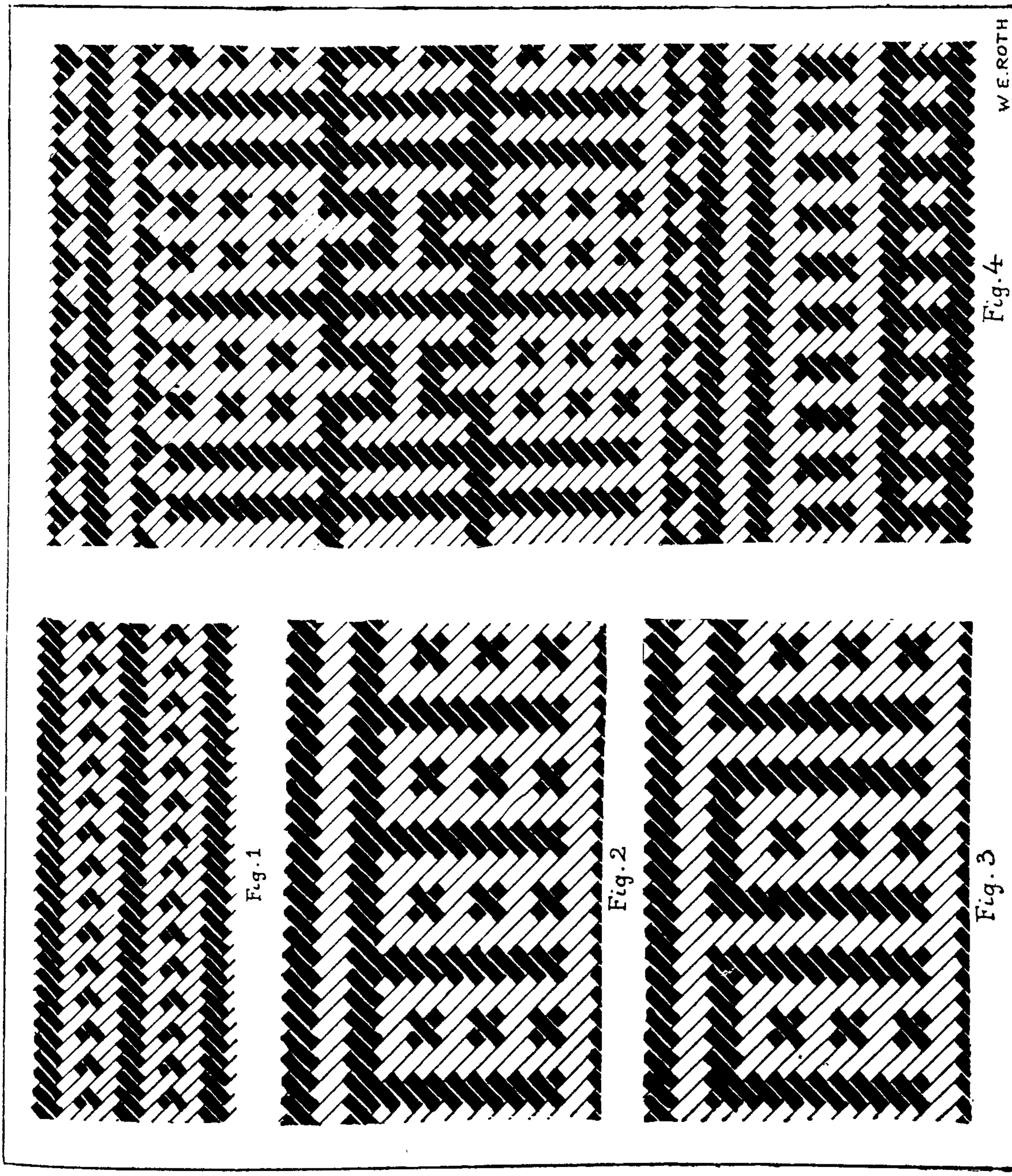
Fig. 3



W E ROTH

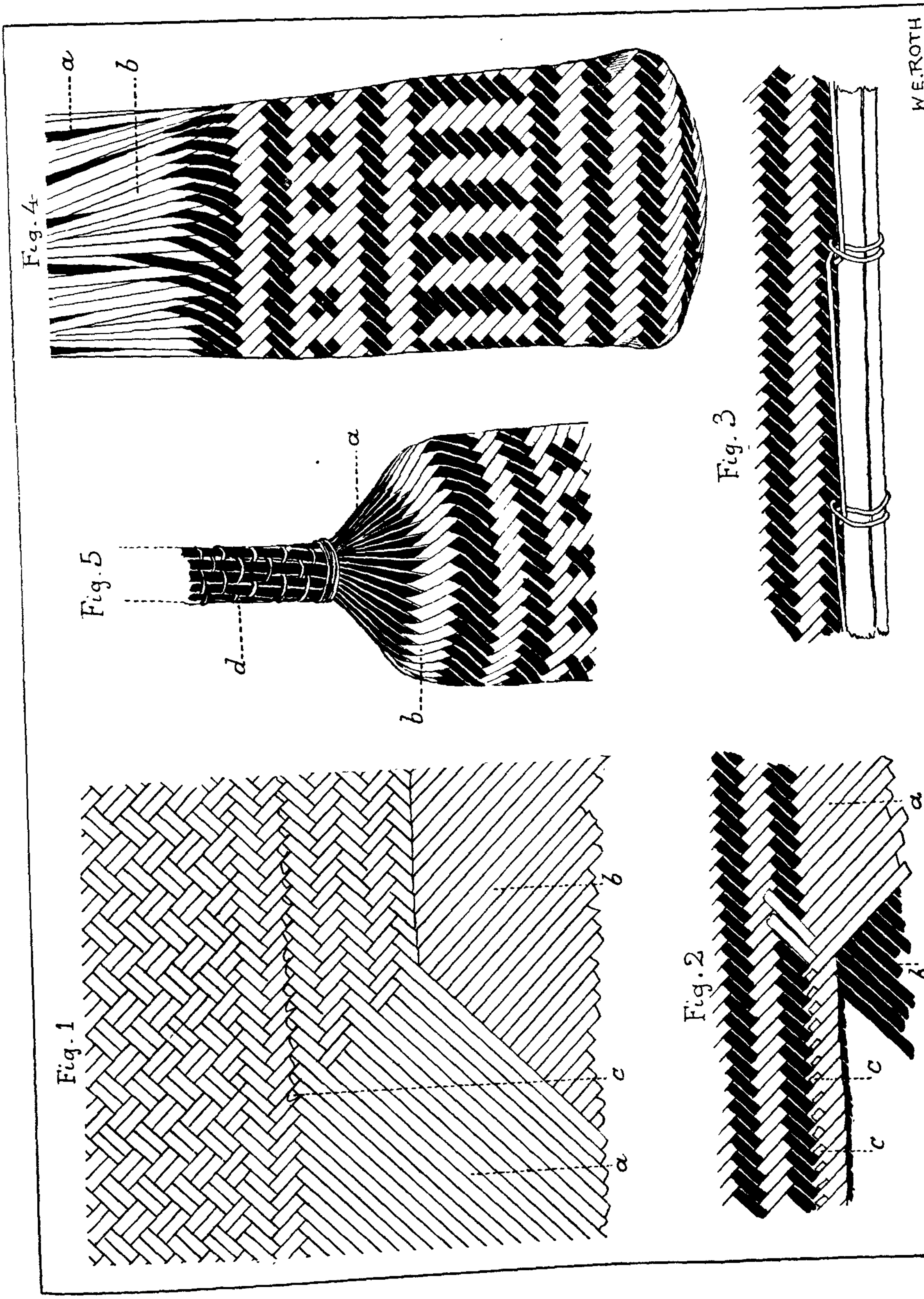
HOUR-GLASS PEGALL PATTERNS.

Dog : See previous plates.



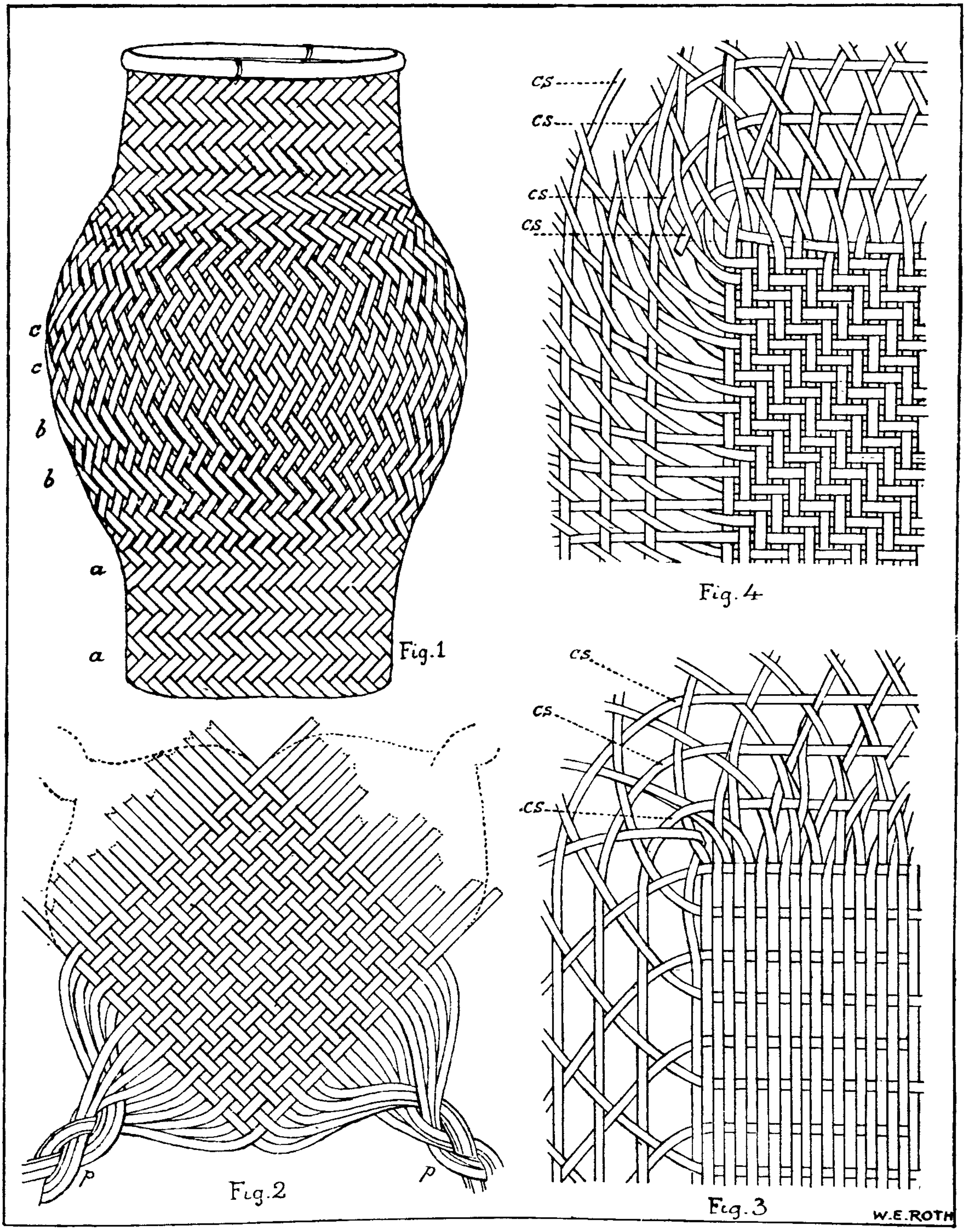
HOUR-GLASS PEGALL PATTERNS.

Meanings unknown, even to their makers.



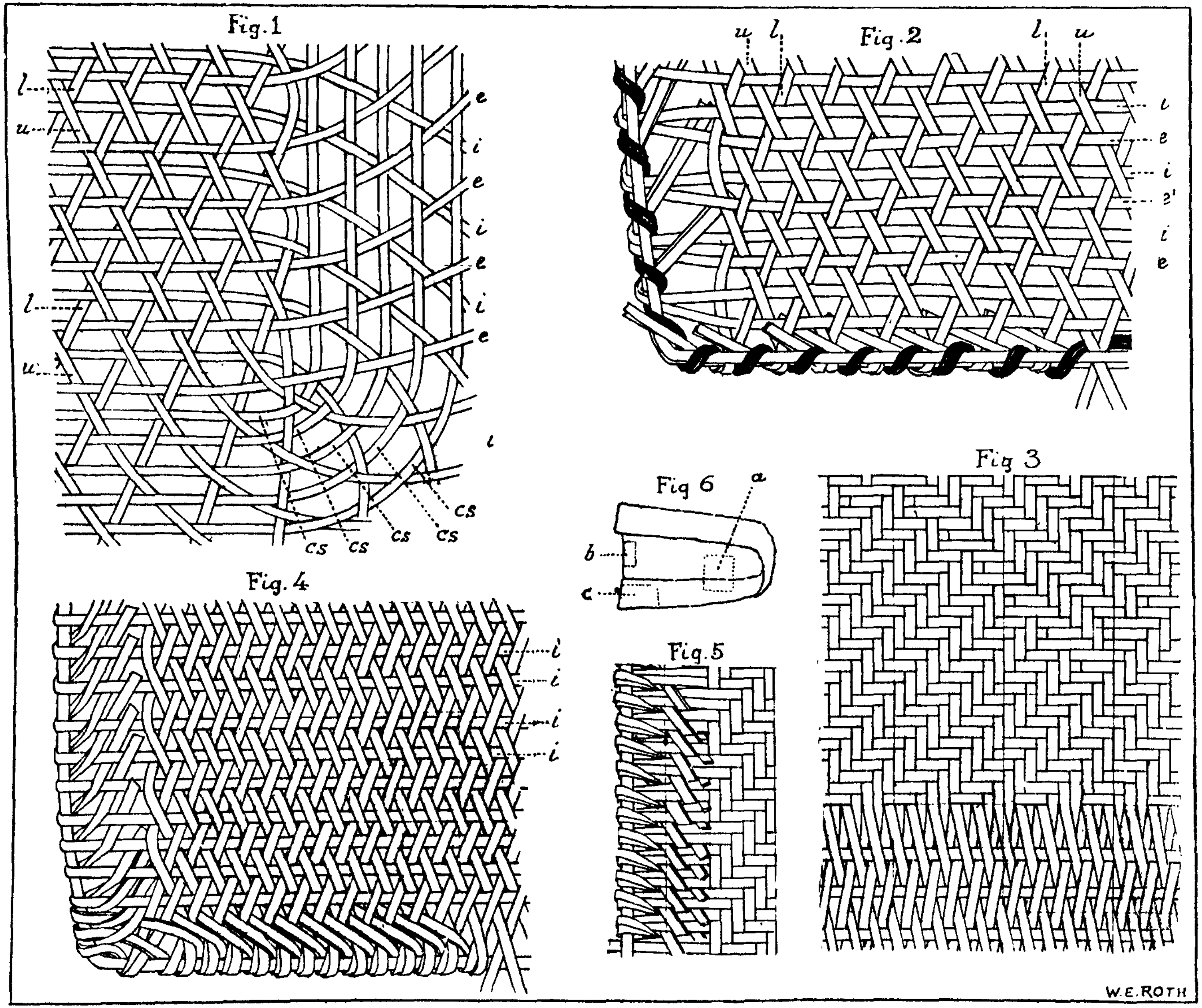
HOUR-GLASS PEGALL PATTERNS.

Stages in the manufacture of the completion of the edges (Figs. 1, 2, 3). *Child's Rattle* (Figs. 4, 5).



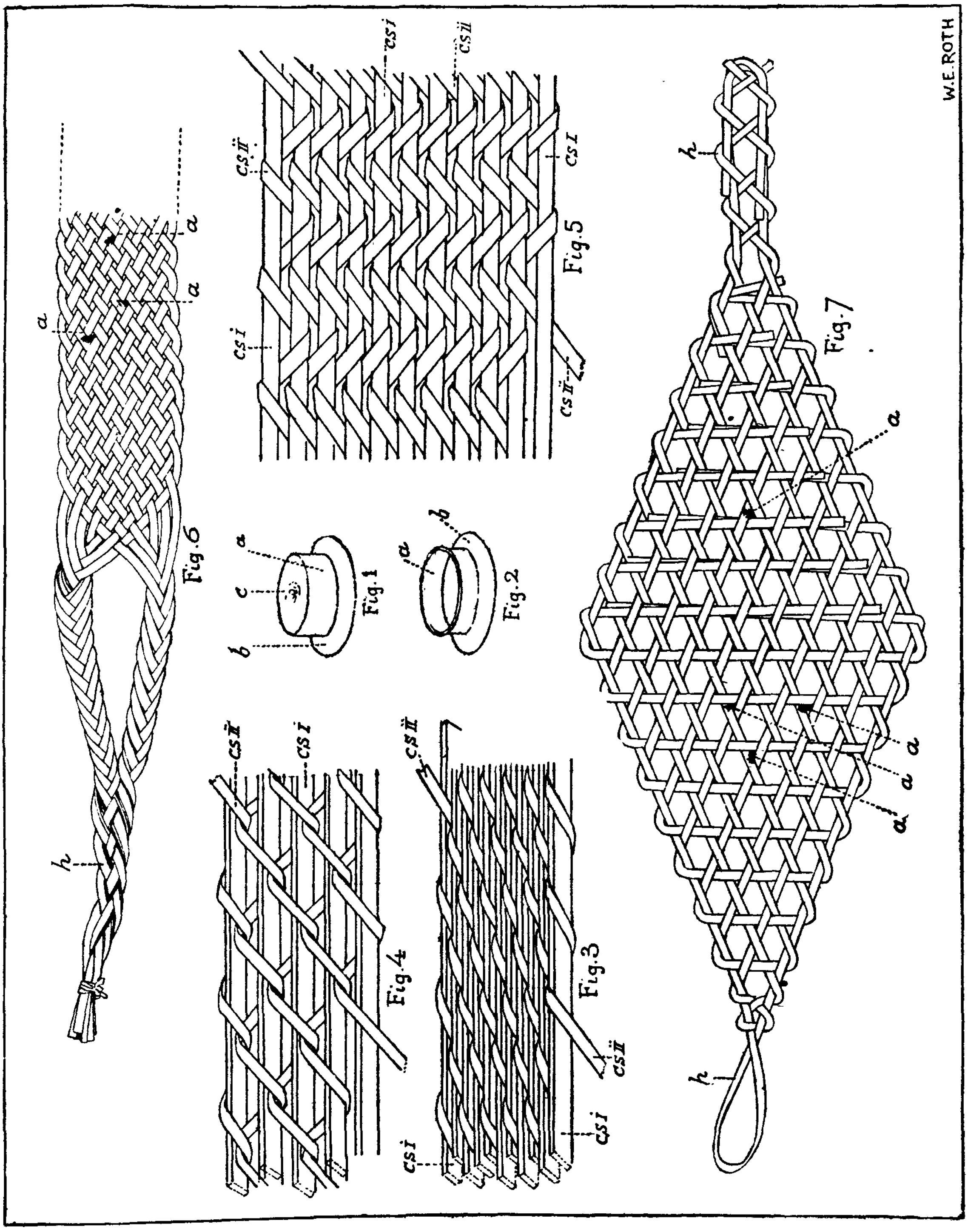
BASKETS.

Pitcher-shaped (Fig. 1 , bundle-shaped (Fig. 2), and shallow round cornered (Figs. 3, 4) types.

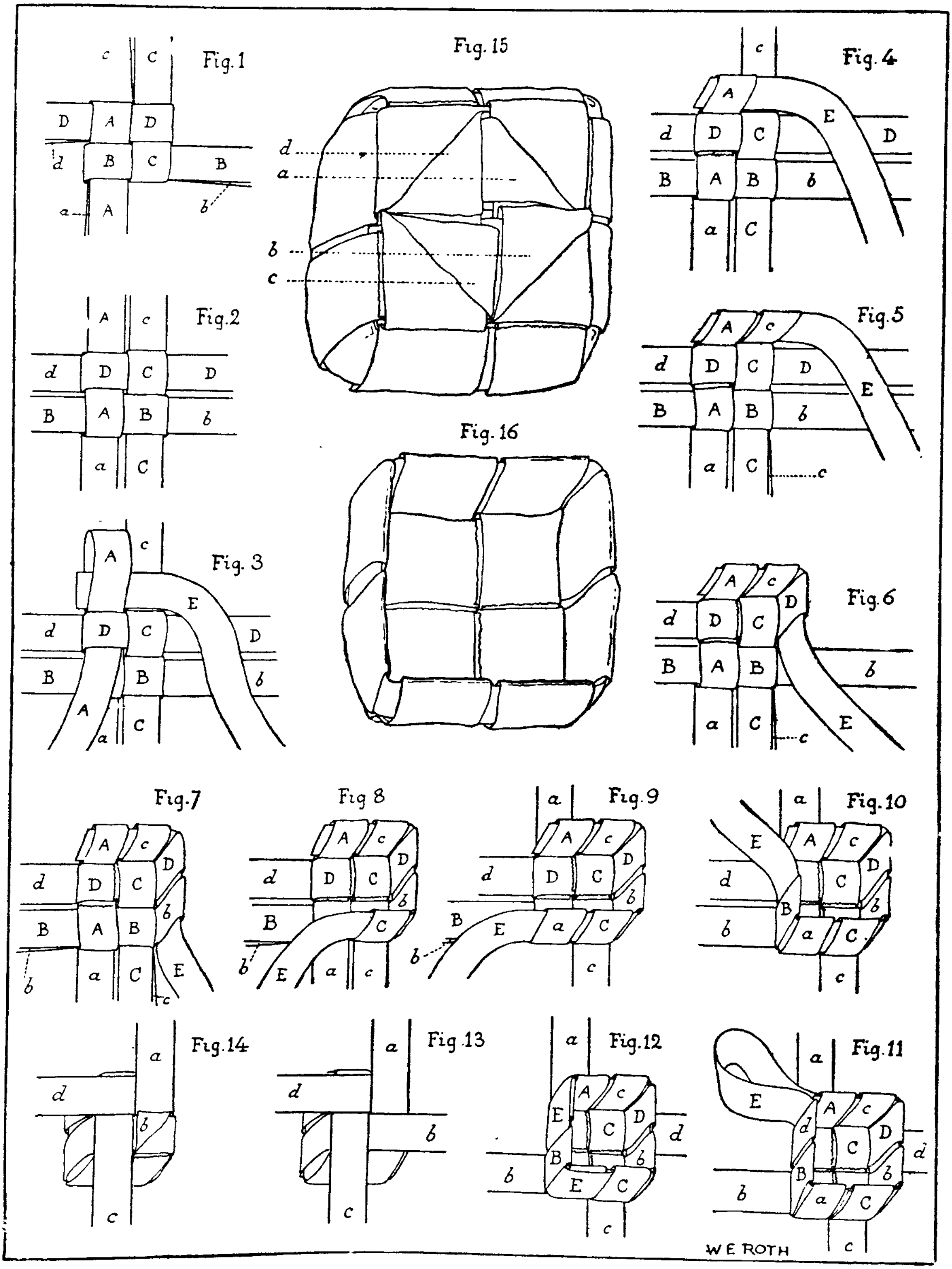


BASKET.

Shallow round-cornered (Fig. 1). *Knapsack or Suriana* (Fig. 6): The portion marked *c* is enlarged in Figs. 2 and 3; *b* is identical with Fig. 5, and *a* with Fig. 3.

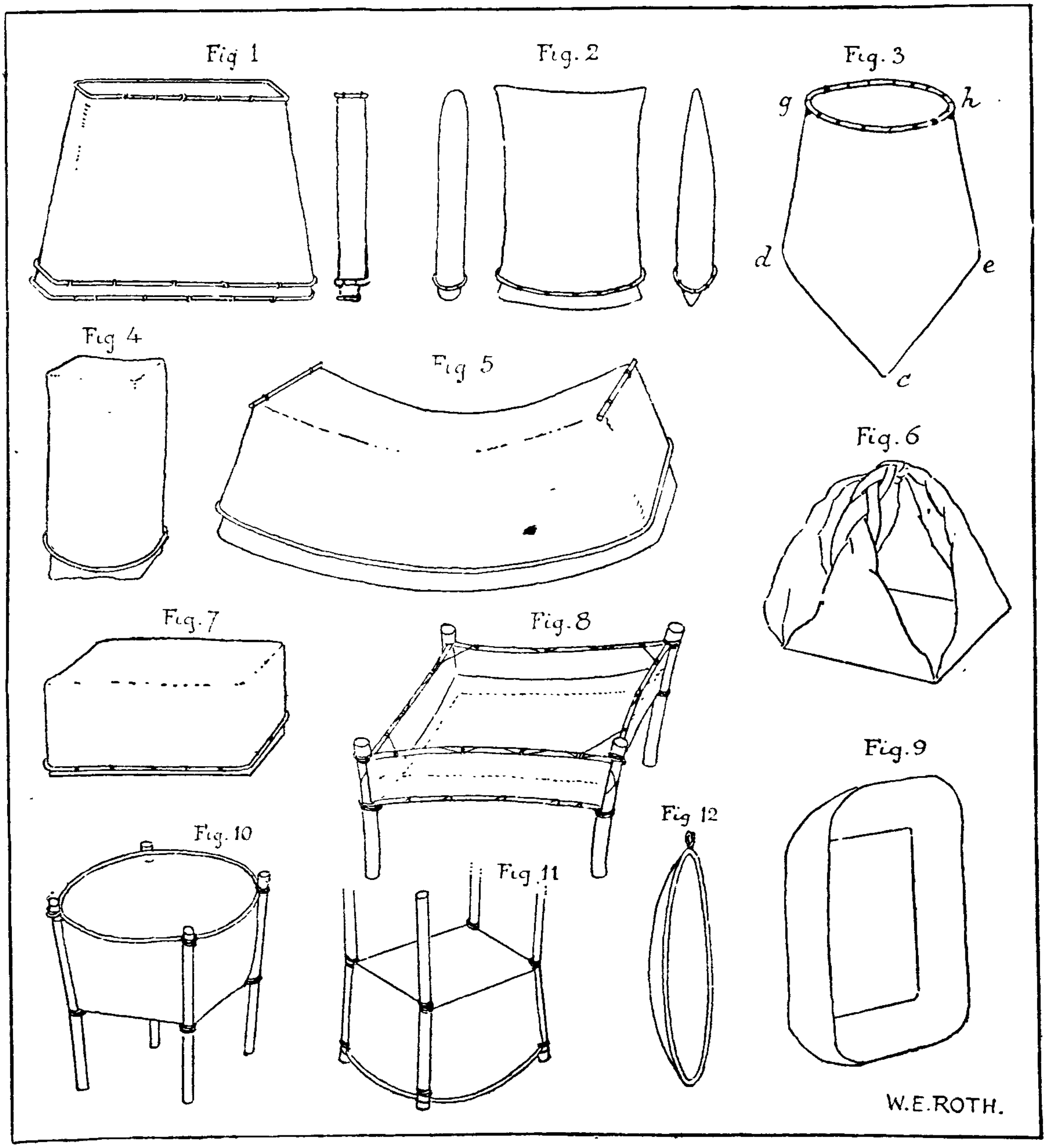


Feather-crowns (Figs. 2, 3, 4). *Hats* (Figs. 1, 5). *Ant-mats* (Figs. 6, 7).



LEAF-STRAND BOX.

Showing stages in manufacture.



VARIOUS ARTICLES MADE OF BASKETRY.

Satchels (Figs. 1, 2). Conical Basket (Fig. 3). Round Pegall (Fig. 4). "Doctor's" Pegall (Fig. 5). Bundle-shaped Basket (Fig. 6). Ordinary Pegall (Fig. 7). Square Tray (Fig. 8). Shallow round-cornered Basket (Fig. 9). Cassava-cake Baskets (Figs. 10, 11). Concave Circular Tray (Fig. 12).

MISCELLANEA.

PROCEEDINGS OF THE ROYAL ANTHROPOLOGICAL INSTITUTE, 1912.

January 23rd, 1912.

Annual General Meeting. (See p. 1.)

February 6th, 1912.

Ordinary Meeting. Mr. A. L. LEWIS in the chair.

The minutes of the last meeting were read and carried.

The election was announced of Captain J. H. W. MORGAN and Mr. NEWTON H. HARDING as Ordinary Fellows of the Institute.

Mr. D. MACRITCHIE read a paper entitled "The Kayak in North-Western Europe," illustrated by lantern slides.

The paper was discussed by the CHAIRMAN and the SECRETARY, and Mr. MACRITCHIE replied.

February 20th, 1912.

Ordinary Meeting. Mr. A. P. MAUDSLAY, President, in the chair.

The minutes of the last meeting were read and carried.

Dr. W. L. H. DUCKWORTH read a paper entitled "Further Cave Exploration in Gibraltar in September, 1911," illustrated by lantern slides.

The paper was discussed by Sir ARTHUR EVANS, Dr. SHRUBSALL, Mr. HAZZLEDINE WARREN, and the PRESIDENT, and Dr. DUCKWORTH replied.

The CHAIRMAN announced that Mr. A. L. LEWIS had been elected Officier d'Académie and tendered to him the hearty congratulations of the Institute upon the honour thus conferred.

Mr. A. L. LEWIS read a paper on "Some Prehistoric Monuments in the Departments Gard and Bouches des Rhône," illustrated by lantern slides.

The paper was discussed by Sir ARTHUR EVANS, Mr. PARKYN, and the PRESIDENT, and Mr. LEWIS replied.

March 5th, 1912.

Ordinary Meeting. Mr. A. P. MAUDSLAY, President, in the chair.

The minutes of the last meeting were read and carried.

The election was announced of Mr. F. J. BENNETT and MISS O. MACLEOD as Ordinary Fellows of the Institute.

Mr. E. J. WAYLAND exhibited a number of stone flakes from Portuguese East Africa.

Mr. N. W. THOMAS read a paper on "The Tribes of the Central Province of Southern Nigeria," illustrated by lantern slides and phonographic records.

December 10*th*, 1912.

Ordinary Meeting. Dr. A. P. MAUDSLAY, President, in the chair.

The minutes of the last meeting were read and confirmed.

The election was announced of Miss E. ANDREWS and Mr. G. R. CARLINE as Ordinary Fellows of the Institute.

Dr. D. E. DERRY read a paper on "Ancient and Modern Nubas," illustrated by lantern slides and specimens.

The paper was discussed by Dr. C. G. SELIGMANN, Dr. WOOD JONES, Dr. KEITH, Professor WATERSTON, Dr. SHRUBSALL and the PRESIDENT, and Dr. DERRY replied.

The PRESIDENT announced that Dr. MAX UHLE had been elected an Honorary Fellow of the Royal Anthropological Institute.

The PRESIDENT announced that he had appointed Messrs. R. H. PYE and O. M. DALTON as Auditors of the Institute's accounts.

Note on Prehistoric Pottery from Japan and New Guinea.

[With Plates LXVI and LXVII.]

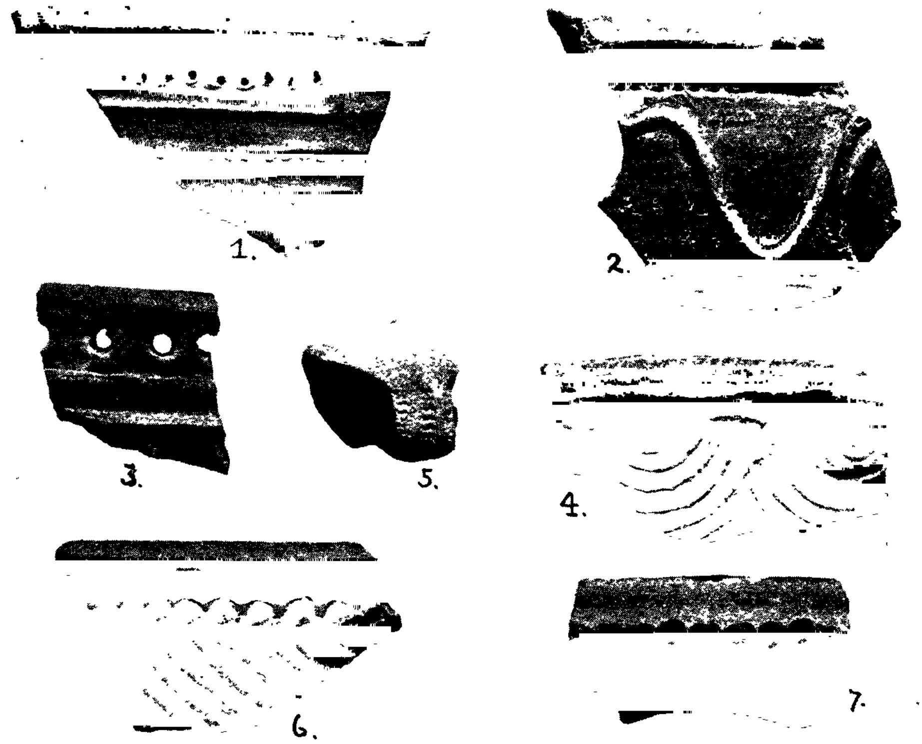
By T. A. Joyce.

To the volume of *Anthropological Essays*, dedicated to Sir Edward B. (then Dr.) Tylor, which was published in 1907, Dr. C. G. Seligmann and I contributed a note "On Prehistoric Objects in British New Guinea." The paper was accompanied by a number of plates three of which were devoted to pottery fragments found at Rainu, Collingwood Bay, and now in the British Museum. These fragments prove the existence in former times of pottery vessels of a class considerably above the powers of the present-day native. The paste is usually better, and the firing more complete, while the decoration is far more varied, and at the same time stronger and more vigorous than is the case with pots of the present date. Other traces of a culture, differing from that of the present time, occur; such as stone pestles, found at Cape Nelson, just north of Rainu, in the possession of natives, who, being ignorant of their use, regarded them as charms (see *Man*, 1908–1; pestles are not used at the present time in the preparation of food).

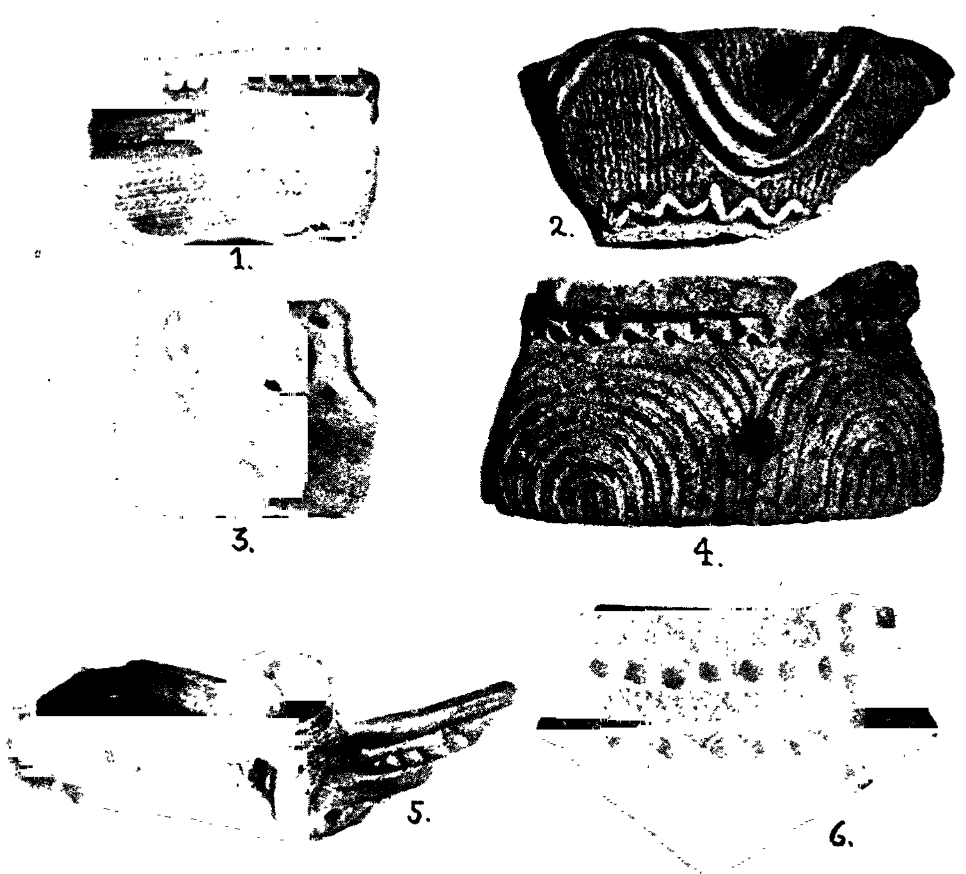
Since the above paper appeared I have been much struck by the close resemblance in quality and ornament between this early New Guinea pottery and prehistoric pottery found in ancient shell-heaps and residential sites in Japan. This prehistoric pottery belongs to the Stone Age, was made without the aid of a wheel, and was often imperfectly fired. It was followed by a distinct type of wheel-made pottery of better quality and severer style, associated with implements and weapons of metal. The two periods are amply illustrated in Dr. Neil Gordon Munro's book on *Prehistoric Japan*. Of the early type of pottery Dr. Munro writes: "It is usually, though not invariably, of coarse texture, is never of the hard consistence of stoneware or porcelain, and is never turned on the wheel. It is commonly of an ornate and sometimes of a highly elaborate kind . . . the material . . . is a coarse clay tempered with sharp sand, and occasionally particles of quartz or small pebbles . . . As a rule this pottery is imperfectly baked. On section a dark streak, due to imperfect firing, is then seen in the middle of the paste. . . . The primitive pottery is never so hard as stoneware, but is sometimes uniformly fired; naturally a feature of the thinner vessels. . . . The colour usually approaches that of terra-cotta, with varying shades running into grey, dark brown, or even black. . . . Mica is not unfrequently found in the paste." The above description applies equally well to the early New Guinea pottery. As for the ornament, the similarity becomes obvious after an inspection of the two plates accompanying this note. Plates LXVI, A, and LXVII, A, show Rainu pottery; Plates LXVI, B, and LXVII, B, show Japanese. For the two photos of Japanese pottery I am indebted to the kindness of Mr. Vallance of the Royal Scottish Museum, Edinburgh, where Dr. Munro's collection is now exhibited. The New Guinea fragments are in the British Museum. In considering Plate LXVI attention need merely be called to the chief points of similarity, such as the punched ornament in A1 and B1, and the larger circular apertures, each surrounded by a low rim, in A3 and B3. Meanders in relief are seen in A2 and B2, and incised concentric arcs in A4 and B4. A5 shows a fragment bearing a small "ribbon" handle marked down the centre with a line of incisions. B5

a more elaborate loop-handle of similar shape, with a deep groove replacing the hatched line of the New Guinea specimen. A6 and B6 show applied bands of clay marked with thumb impressions, on a ground of incised diagonal hatching. In Plate LXVII, A1 and B1 show rims closely akin in character of ornament; A2 and B2 illustrate similar fragments from bodies, though the design of B2 seems to be applied (after the fashion of A4 and Plate LXVI, A2) rather than incised. One of the most remarkable instances of similarity is seen in a peculiar type of handle, A3 and 3*a* and B3, common to both localities; and it is even more interesting to note how, in both cases, these handles tend to become repeated with unnecessary frequency, and at the same time to degenerate into merely ornamental motives; compare A5 and 5*a* with B5. Applied ornament of a spiral character is seen in A4 and 4*a* and B4; while A6 and B6 show fragments of ornamental rims viewed from above. Whether the shapes of the pots exhibited a like similarity it is impossible to say. The Japanese vessels at any rate were cast in a great variety of types; the New Guinea vessels seem in the main to have been bowls and dishes, though the fragments are mostly too small to judge with certainty. However, narrow necks and spouts are found occasionally. The chief difference between the Rainu and Japanese pots seems to lie in the fact that the latter are usually furnished with heavier and more definite rims (compare Plate LXVI, A1, 2, 6). Pottery figurines, further, are found in Japan which are altogether lacking in New Guinea. For the rest the similarity is remarkable, both in material and ornament. Nor is it only the details of the ornament which are so akin, but the whole spirit of the scheme of decoration and the manner in which it is applied. It would of course be ridiculous at the present moment to do more than call attention to what, at least, is an interesting instance of parallelism.

T. A. JOYCE.

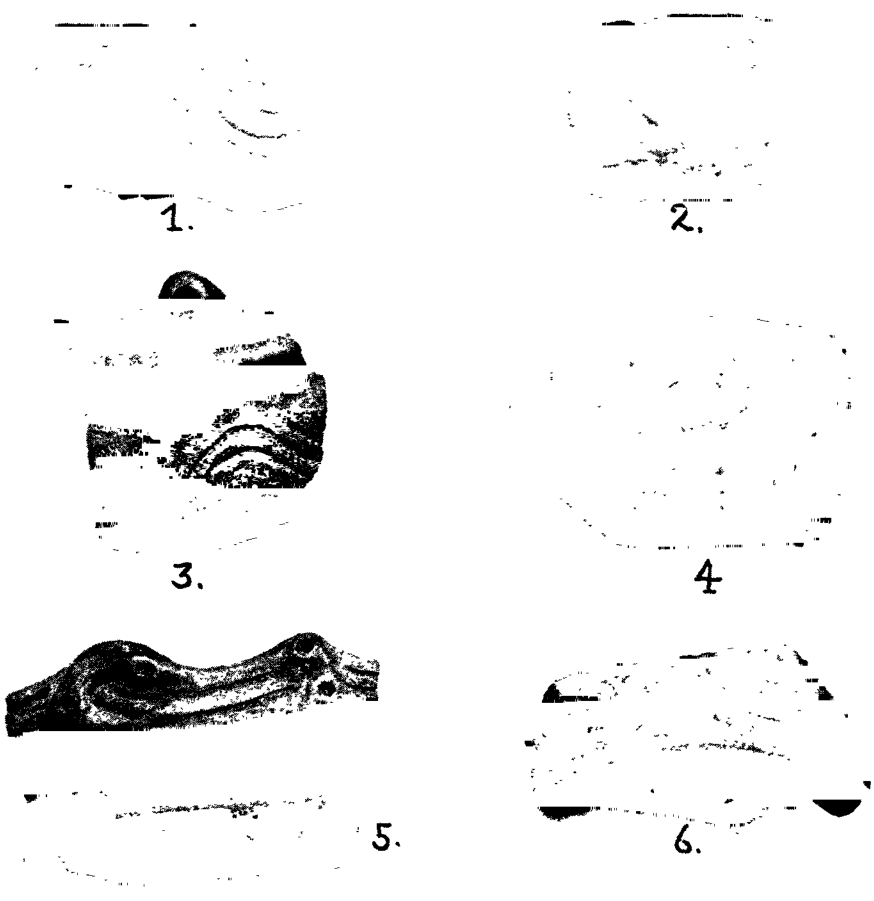


A.—PREHISTORIC POTTERY FROM NEW GUINEA.



B.—PREHISTORIC POTTERY FROM JAPAN.

A.—PREHISTORIC POTTERY FROM NEW GUINEA.



B.—PREHISTORIC POTTERY FROM JAPAN.

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NOTE.—*The Numbers in ordinary type refer to the papers; the numbers in Clarendon type are the reference numbers of* MAN, 1912; *where necessary the page references to* MAN *are added in brackets. For collected references see especially Africa, America, Archæology, Atharaka, Australia, Bronze, Copper, Dusuns, Egypt, Essex, Færoe Islanders, Folklore, Gibraltar, Gold, Ipswich Skeleton, Iron, Japan, Kagoro, Kayak, Linguistics, Mailu, Physical Anthropology, Pomeroon District, Prehistoric, Religion, Silver, Tin, Turkestan, Walton-on-Naze, Zagháwa.*

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